

Hornsea Project Three
Offshore Wind Farm



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Hornsea 3
Offshore Wind Farm

 **Orsted**

Environmental Impact Assessment

Environmental Statement

Volume 3

Chapter 3: Ecology and Nature Conservation

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Glossary

Term	Definition
Biodiversity Action Plan	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 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, the Royal Society for the Protection of Birds, Birdwatch Ireland, the Scottish Ornithologists' Club and the Welsh Ornithological Society, 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.
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 Habitat Regulations Assessment process during the pre-application period. The Onshore Ecology EWG (referred to in this report as the Onshore EWG) comprises local planning authorities, Natural England, the Environment Agency, the RPSB and Norfolk Wildlife Trust.
European Protected Species	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.
Habitats Regulations Assessment	The Habitats Regulations, and Offshore Marine Conservation Regulations where applicable, require competent authorities, before granting consent for a plan or project, to carry out an Appropriate Assessment (AA) in circumstances where the plan or project is likely to have a significant effect on a European site or a European Marine site (either alone or in combination with other plans or projects). Habitats Regulations Assessment (HRA) refers to the whole process of assessment, including the AA stage (where one is required). For Hornsea Three, a Report to Inform Appropriate Assessment (RIAA) has been prepared to accompany the application for development consent (document reference A5.2).
Hornsea Three onshore elements	Hornsea Three landfall area, onshore cable corridor, the onshore HVAC booster station, the onshore HVDC converter/HVAC substation and the interconnection with the Norwich Main National Grid substation.
Local Biodiversity Action Plan	Local BAPs have been produced by many counties, to detail measures to conserve, protect and enhance local/county biological diversity.
Local Nature Reserve	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	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	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.

Term	Definition
Natura 2000	A coherent European ecological network of Special Areas of Conservation and Special Protection Areas.
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 priority habitats are those identified as being the most threatened and requiring conservation action under the UK BAP.
Priority Species	UK Biodiversity Action Plan 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	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	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	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.
Water Framework Directive	Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for community action in the field of water policy.
Wetland Bird Survey	The Wetland Bird Survey is the monitoring scheme for non-breeding water birds 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, 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.

Term	Definition
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, 2013, native woodland is defined as a group of trees with overlapping canopies covering at least 0.1 ha, at least half of which are native species..
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
AA	Appropriate Assessment
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
EC	European Commission
ECoW	Ecological Clerk of Works
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
HRA	Habitats Regulations Assessment
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IEEM	Institute of Ecology and Environmental Management

Acronyms	Description
JNCC	Joint Nature Conservation Committee
LBAP	Local Biodiversity Action Plan
LNR	Local Nature Reserve
LWS	Local Wildlife Site
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
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
NVC	National Vegetation Classification
PEA	Preliminary Ecological Appraisal
PINS	Planning Inspectorate
PPG	Planning Policy Guidance
PPS	Planning Policy Statements
RIAA	Report to Inform Appropriate Assessment
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 (area)
km	Kilometre (distance)
m	Metre (distance)

3. Ecology and Nature Conservation

3.1 Introduction

- 3.1.1.1 This chapter of the Environmental Statement presents the results of the Environmental Impact Assessment (EIA) for the potential impacts of the Hornsea Project Three offshore wind farm (hereafter referred to as 'Hornsea Three') on ecology and nature conservation. Specifically, this chapter considers the likely effects of Hornsea Three landward of Mean High Water Springs (MHWS) during its construction, operation and maintenance, and decommissioning.
- 3.1.1.2 Likely effects on intertidal or subtidal zones are covered in volume 2, chapter 2: Benthic Ecology; chapter 3: Fish and Shellfish Ecology; chapter 4: Marine Mammals; and chapter 5: Offshore Ornithology.
- 3.1.1.3 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 3.7 of this chapter. The full assessment of effects on the integrity of Natura 2000 sites is contained within the Report to Inform Appropriate Assessment (RIAA) for Hornsea Three which accompanies the Development Consent Order (DCO) application (document reference A5.2).
- 3.1.1.4 This chapter summarises information from the following technical reports and information:
- Extended Phase 1 Habitat Survey (results presented in volume 6, annex 3.1: Desk Study and Phase 1 Habitat Survey);
 - Hedgerow Survey (results presented in volume 6, annex 3.2: Hedgerow Survey);
 - Desmoulin's Whorl Snail Survey (results presented in volume 6, annex 3.3: Desmoulin's Whorl Snail Survey);
 - White Clawed Crayfish Survey (results presented in volume 6, annex 3.4: White Clawed Crayfish Survey);
 - Great Crested Newt (GCN) Survey (results presented in volume 6, annex 3.5: Great Crested Newt Survey);
 - Reptile Survey (results presented in volume 6, annex 3.6: Reptile Survey);
 - Water Vole Survey (results presented in volume 6, annex 3.7: Water Vole Survey);
 - Bat Surveys (results presented in volume 6, annex 3.8: Bat Surveys);
 - Wintering and Migratory Bird Survey (results presented in volume 6, annex 3.9: Onshore Ornithology – Wintering and Migratory Bird Survey);
 - Onshore Breeding Bird Survey (results presented in volume 6, annex 3.10: Onshore Ornithology – Breeding Bird Survey);
 - Otter Survey (results presented in volume 6, annex 3.11: Otter Survey¹);

- Badger Survey (results presented in volume 6, annex 3.12: Badger Survey¹); and
- Hazel Dormouse, Red Squirrel and Freshwater Pearl Mussel Desk Study (results presented in volume 6, annex 3.13: Hazel Dormouse, Red Squirrel and Freshwater Pearl Mussel Desk Study).

3.1.1.5 A National Vegetation Classification (NVC) Survey was also undertaken and the results have been incorporated within this chapter where appropriate (results available on request).

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), as amended. It accompanies the application to the Secretary of State for development consent.

3.2.1.2 It is intended that the Environmental Statement will provide statutory and non-statutory consultees with sufficient information to complete the examination of Hornsea Three and will form the basis of agreement on the content of the DCO.

3.2.1.3 In particular, this Environmental Statement chapter:

- Presents the existing environmental baseline information established from desk studies, surveys and consultation;
- Presents the potential environmental effects on ecology and nature conservation arising from Hornsea Three, based on the information gathered and the analysis and assessments undertaken;
- 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.

3.3 Study area

3.3.1.1 The Hornsea Three ecology and nature conservation study area was discussed and agreed with Natural England and the Onshore Ecology Expert Working Group (referred to in this report as the 'Onshore EWG'). The Onshore EWG comprises local planning authorities, Natural England, the Environment Agency, the Royal Society for Protection of Birds (RPSB) and Norfolk Wildlife Trust.

¹ Please note that the information in volume 6, annex 3.11 and volume 6, annex 3.12 is confidential as these annexes contain sensitive information regarding protected species. A non-confidential version accompanies the application. The full versions will, however, be

provided to Natural England and other consultees with a genuine need for the information. Should you require a copy, please make your request to the Planning Inspectorate.

- 3.3.1.2 For the designated sites desk study, the initial identification of sites that might be affected used a search area of 2 km from the onshore elements of Hornsea Three for sites of higher than County importance. For sites of County importance or below, the area was reduced to 1 km unless an impact pathway existed that could extend beyond this distance. It is considered that there is minimal potential for impacts on such sites from construction of onshore infrastructure beyond 1 km in the absence of a clear impact pathway.
- 3.3.1.3 For the protected species data search, a search area of 2 km from the onshore elements of Hornsea Three was used for all species other than birds and bats. For birds and bats, this area was increased to 5 km to take into account the greater mobility of these species and hence the greater relevance of records of these groups beyond a 2 km search area.
- 3.3.1.4 A data search area of 1 km is usually considered to be of greatest relevance but guidance also notes that the appropriate search area should be extended in some cases, such as for mobile species (CIEEM, 2017). The appropriate search area for the onshore elements of Hornsea Three was therefore defined based on professional judgment of the likely impact pathways and the distances over which these operate.
- 3.3.1.5 Sites designated for geological interest are not assessed in this chapter. Refer to chapter 1: Geology and Ground Conditions for an assessment of effects on these sites.
- 3.3.1.6 The Hornsea Three onshore ecology and nature conservation survey area for field data collection was based a 200 m cable corridor search area, which included the locations of the proposed onshore cable corridor, onshore HVAC booster station, HVDC converter/HVAC substation and the interconnection with Norwich Main National Grid substation. These components were the focus of the Preliminary Environmental Information Report (PEIR). The Hornsea Three onshore ecology and nature conservation survey area included an appropriate buffer from the onshore elements of Hornsea Three for the species groups surveyed of up to a maximum of 250 m. These survey areas were discussed with Natural England and other stakeholders and the Onshore EWG (see Table 3.5).
- 3.3.1.7 Refinements to the alignment of the onshore cable corridor between the PEIR stage and production of the Environmental Statement have, in some cases, resulted in field surveys being undertaken in locations no longer relevant to the project envelope, and have also resulted in some areas not being fully surveyed if route refinements were made after the optimal survey period for a particular species group had passed, or where access to survey areas not previously covered could not be arranged before the end of the survey period. The surveys undertaken are considered to provide sufficient information on which to base the assessment of effects as presented in this chapter. Where necessary, pre-commencement surveys will be undertaken prior to construction in line with the measures set out in the Outline EMP (document reference A8.6). Details of the survey areas for each of the the various species groups assessed in this chapter are provided in volume 6, annexes 6.3.1 - 6.3.13.
- 3.3.1.8 The survey areas were discussed with Natural England and other stakeholders, including the Onshore EWG (see Table 3.5).
- 3.3.1.9 The Hornsea Three ecology and nature conservation study area used for the assessment of effects in this chapter comprises the Hornsea Three onshore elements (as set out above), the storage areas and compounds and the survey areas for species up to 250 m where appropriate. For designated sites, the study area for assessment included all sites within 1 km of Hornsea Three and additional sites beyond that distance (up to 2 km) where an impact pathway was identified. Such impact pathways were predominantly confined to sites that are hydrologically linked i.e. downstream of the works area, or sites designated for mobile species.
- 3.3.1.10 Figure 3.1 shows the 250 m study area buffer within which protected species survey information was assessed, and the 1 km, 2 km and 5 km buffer zones within which the desk study was undertaken.

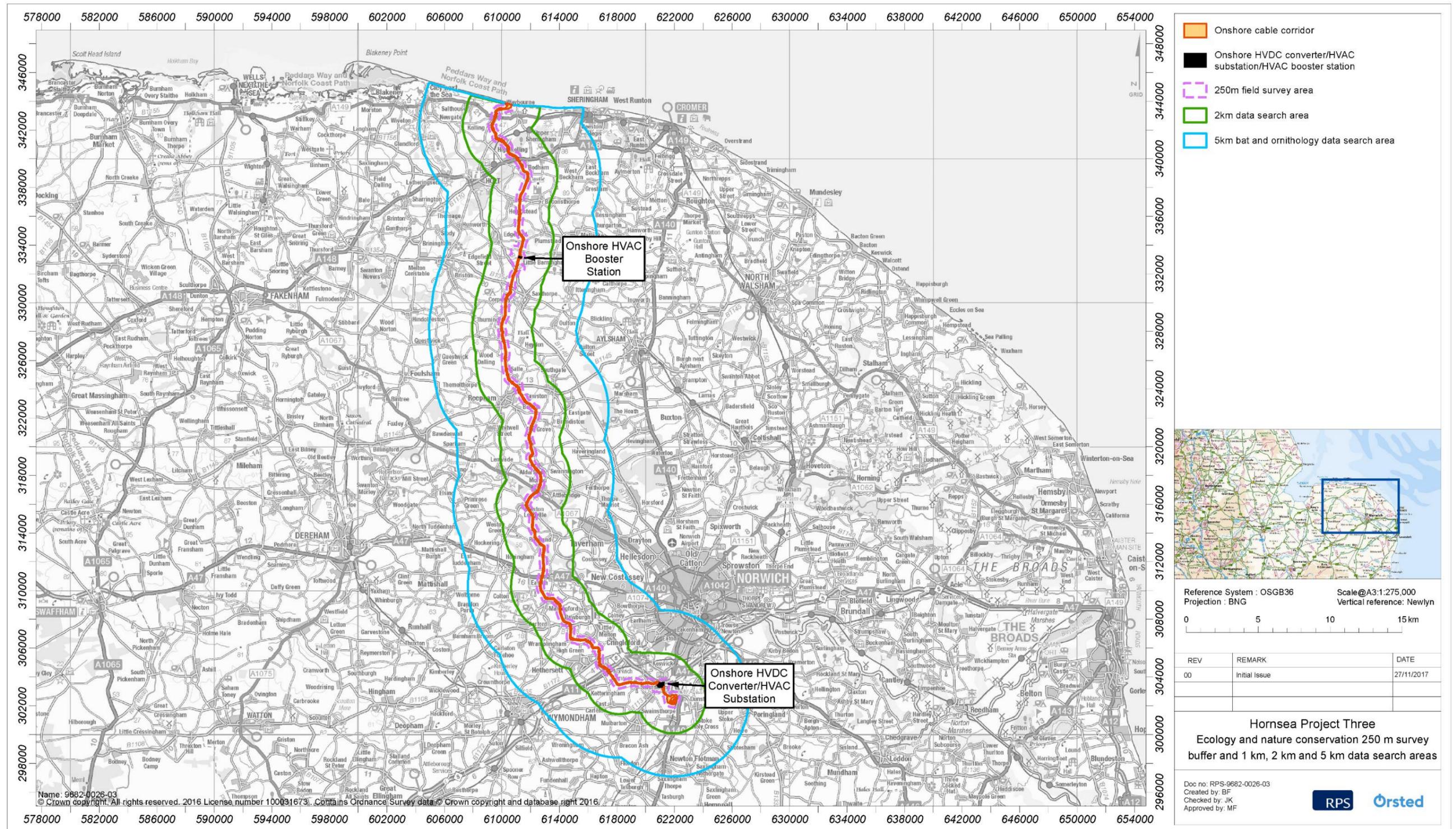


Figure 3.1: Hornsea Three ecology and nature conservation 250 m survey buffer and 1 km, 2 km and 5 km data search areas

3.4 Planning policy and legislative context

3.4.1 National Policy Statements

- 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). The NPS for Electricity Networks Infrastructure (EN-5) (DECC, 2011b) 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. This guidance states that the development should be assessed under the Conservation of Habitats and Species Regulations (2017) (the 'Habitats Regulations', as amended) and that applicants should have regard to effects of the development on sites, habitats and species, including 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 the matters that should be included in an applicant's assessment. These are summarised in Table 3.1.

Table 3.1: 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 Environmental Statement
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 effects 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 effects on wintering and migratory birds are assessed in volume 2, chapter 5: Offshore Ornithology: and the RIAA which accompanies the DCO application (document reference A5.2). The effect 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 Environmental Statement 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 have been collated to determine ecology features of concern, and inform the assessment of effects, 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).

Summary of NPS EN-1 and NPS EN-5 provision	How and where considered in the Environmental Statement
The applicant should show how 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 at section 3.10. Full details are included in the Outline Ecological Management Plan (EMP) that accompanies the DCO application (document reference A8.6). These have been informed by baseline surveys.
The likely effects 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 effects of the onshore elements 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 in section 3.11 and mitigation measures have been incorporated into Hornsea Three to ensure that no significant adverse effect on the sites would result (Table 3.19).
Particular consideration should be given to the likely effects of on feeding and hunting grounds, migration corridors and breeding grounds (NPS EN-5, paragraph 2.7.2).	The likely effects of Hornsea Three 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 3.11).

- 3.4.1.4 NPS EN-1 highlights a number of points relating to the determination of an application and in relation to mitigation (paragraphs 5.3.5-5.3.8, 5.3.16-5.3.20), these are summarised in Table 3.2.

Table 3.2: 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 Environmental Statement
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 (paragraphs 5.3.5, 5.3.6).	Relevant baseline data have 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). Reference is made to the potential effects of climate change on biodiversity in section 3.7.3.

Summary of NPS EN-1 and NPS EN-5 policy on decision making (and mitigation)	How and where considered in the Environmental Statement
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 Hornsea Three onshore cable corridor 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 effects on biodiversity (Table 3.19). Reasonable alternative onshore cable corridors 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 Hornsea Three onshore ecology and nature conservation study areas, have been assessed and are explained in this chapter. The value of each feature has informed the Hornsea Three assessment of effects (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 the Onshore EWG. Records of meetings and communications are provided in this chapter (Table 3.5). A series of species and habitat surveys have been undertaken in order to inform this assessment of effects (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 3.19).
Appropriate mitigation measures should be included as an integral part of the development: <ul style="list-style-type: none"> 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 effects are described in this chapter (see Table 3.19) and are further developed in the Outline EMP submitted as part of the DCO application ((document reference A8.6) to be 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.

Summary of NPS EN-1 and NPS EN-5 policy on decision making (and mitigation)	How and where considered in the Environmental Statement
Mitigation measures agreed with Natural England and confirmation as to whether or not Natural England 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 assessment. Records of meetings and other communications are provided in this chapter (Table 3.5). Pre-construction surveys will be required in order to update survey findings and inform any future need for a licence or licences.

3.4.2 Other relevant policies

3.4.2.1 A number of other policies are relevant to this chapter including:

- National Planning Policy Framework (NPPF) (DCLG, 2012);
- Web-based National Planning Practice Guidance (NPPG) formulated by the Department for Communities and Local Government (DCLG, 2014);
- UK Biodiversity Action Plan (UK BAP) (JNCC, 2011); and
- Norfolk BAP (Norfolk Biodiversity Partnership, various).

3.4.2.2 Key provisions of the national policies are set out in Table 3.3, along with details as to how these have been addressed within the assessment.

Table 3.3: Summary of other relevant policies to ecology and nature conservation

Summary of other relevant policy provision	How and where considered in the Environmental Statement
National Planning Policy Framework	
The NPPF sets out the national planning policies for England and the Government's desire to enable sustainable development. 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 are included at paragraph 18 of the NPPF.	Identification and assessment of protected species have been included at sections 3.7 and 3.11 of this chapter respectively.
National Planning Practice Guidance	
The guidance states that the planning system should protect, enhance and conserve the natural and local environment (paragraph 109, section 11 of the NPPG).	Identification and assessment of protected species have been included at sections 3.7 and 3.11 of this chapter respectively.

3.4.2.3 Relevant provisions from the Norfolk Biodiversity Action Plan are provided in Table 3.4.

Table 3.4: Summary of relevant Biodiversity Action Plan provisions

Summary of Biodiversity Action Plan (BAP) provisions	How and where considered in the Environmental Statement
Norfolk BAP	
The Norfolk BAP sets out UK commitments as a signatory to the Convention on Biological Diversity and include plans for the UK's most threatened or endangered species and 14 key habitats. There are 391 Species Action Plans and 45 Priority Habitat Action Plans nationwide. At local level, Local Biodiversity Action Plans (LBAPs) have been developed which are linked to national priorities. The Norfolk BAP is made up of 83 Action Plans for habitats and species describing habitats or species of concern, status in Norfolk and current threats. The BAP outlines objectives, targets and conservation actions. Target dates for the completion of measures described in the plans are provided, along with identified delivery partners, where applicable.	Relevant baseline data have been collated to determine ecology features of concern, and inform the assessment, which sets out effects on Priority Habitats and Species. Identified LBAPs are considered in the assessment section of this chapter (section 3.11).

3.4.3 Legislation

European legislation

- 3.4.3.1 Council Directive 92/43/EEC (the Habitats Directive) provides for protection of animals and plants throughout EU member states through both the designation/classification of European Sites as well as the protection of European Protected Species.
- 3.4.3.2 The Habitats Directive was first transposed into UK law through the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in 2007). In England and Wales, the 1994 Regulations have been superseded by the Conservation of Habitats and Species Regulations 2017.
- 3.4.3.3 The Birds Directive is transposed into UK law through the Wildlife & Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017 and provides a framework for the conservation and management of, and human interactions with, wild birds in Europe.
- 3.4.3.4 All of the above UK Regulations allow for the designation or classification of European Sites as specified under the Habitats Directive including Special Areas of Conservation (SACs), Special Protection Areas (SPAs), and Ramsar sites.

National legislation

- 3.4.3.5 Sites of Special Scientific Interest (SSSIs) are designated under the Wildlife & Countryside Act 1981, as amended. Part II of the Act makes it an offence to damage any sites designated as SSSI. Any works which may potentially damage these sites require prior consultation with Natural England.
- 3.4.3.6 National Nature Reserves (NNRs) are established to conserve and enhance landscapes. They promote public enjoyment and consider the social and economic well-being of those living within them.

3.4.3.7 Local Nature Reserves (LNRs) 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.

3.4.3.8 The Conservation of Habitats and Species Regulations 2017 require that a plan or project that is not directly connected with or necessary for the management of a Natura 2000 site, but which has a likely significant effect on the site, either individually or in combination with other plans or projects, will require an appropriate assessment of the impact of that plan or project on the interests of the Natura 2000 site. An assessment of the potential impacts of Hornsea Three on the qualifying interests of relevant SACs is presented in the RIAA (document reference A5.2), which has been submitted as a supporting document for the DCO application, together with the Environmental Statement.

3.4.3.9 The Hedgerow Regulations 1997 protect hedgerows from removal, with particular protection for 'important' hedgerows. 'Important' hedgerows are defined in the Regulations. 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.

3.4.3.10 The Natural Environment and Rural Communities Act 2006 (NERC Act) provides that Natural England's general purpose is to ensure that the natural environment is conserved, enhanced and managed for the benefit of present and future generations. Section 41 of the NERC Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. Section 41 lists guidance to decision-makers, including local and regional authorities, in implementing their duty under Section 40 of the NERC Act to have regard to biodiversity conservation in England when carrying out their functions.

3.5 Consultation

3.5.1.1 Table 3.5 below summarises the issues raised relevant to ecology and nature conservation, which have been identified during consultation activities to date. Table 3.5 also indicates either how these issues have been addressed within this Environmental Statement or how the Applicant has had regard to them. Further information on the consultation activities undertaken for Hornsea Three can be found in the Consultation Report (document reference number A5.1) that accompanies the DCO application.

3.5.2 Evidence Plan

3.5.2.1 The purpose of the Evidence Plan process is to agree the information Hornsea Three needs to supply to the Planning Inspectorate (PINS), as part of a DCO application for Hornsea Three, with Natural England, the Environment Agency, Norfolk County Council, Norfolk Wildlife Trust and the RSPB. The Evidence Plan (which forms part of the Consultation Report accompanying the application) seeks to ensure compliance with the Habitat Regulations and EIA process.

3.5.2.2 As part of the Evidence Plan process, an Onshore EWG was established comprising the statutory and non-statutory consultees listed in paragraph 3.5.2.1. Meetings of the Onshore EWG are summarised in Table 3.5, together with other consultation relevant to this chapter.

Table 3.5: 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
November 2016	Barford and Wrampingham Parish Council – Scoping Response	The Council would like consideration to be given to is the Wensum River being a SSSI. Any works in its vicinity would have the potential for a negative environmental impact.	HDD is proposed to be employed under the River Wensum. Effects on this site are assessed in section 3.11.1 and the RIAA (document reference A5.2) which accompanies the DCO application.
December 2016	PINS Scoping Opinion	Table 12.12 of the Scoping Report proposed that noise and vibration from the operation and maintenance of the landfall cable, the onshore HVDC converter/HVAC substation and onshore HVAC booster station be scoped out of the EIA process. 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 intertidal area and onshore cable corridor is limited given that there would be no perceptible noise or vibration above the surface of the cable (see chapter 8: Noise and Vibration). Any maintenance requirements for the Hornsea Three onshore cable corridor and intertidal area would be minimal. Effects on birds within the intertidal area during construction are assessed in volume 2, chapter 5: Offshore Ornithology. However, given that the onshore HVAC booster station and onshore HVDC converter/HVAC substation are located 11 km and 41 km respectively from the Hornsea Three intertidal area, activities at these locations will not disturb birds in the intertidal area.
December 2016	PINS - Scoping Opinion	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 (2016) was welcomed. 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, habitats and species of principal importance as listed under Section 41 of the NERC Act 2006 should also be considered.	Section 3.7 of this chapter sets out the identified receptors, including habitats and species of principal importance identified through the UKBAP.
December 2016	PINS - Scoping Opinion	Sources for the desk based study should include reference to the local biological record centre for Norfolk, Norfolk Biodiversity Information Service (NBIS). The comments of the Environment Agency (EA) in their consultation response (see Appendix 3), identified 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 (volume 6, annex 3.1: Desk Study and Phase 1 Habitat Survey). Following consultations, it was determined that RSPB and British Trust for Ornithology (BTO) records would be unlikely to add significant value to the data set. Available BTO data are 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 are no relevant Wetland Bird Survey (WeBS) data as this national survey of wetlands does not cover habitats within the Hornsea Three onshore ecology and nature conservation study area. RSPB do not hold specific records and were consulted as part of the EWG.
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 Statutory Nature Conservation Bodies (SNCBs). The survey methodology for the PEA, and any subsequent habitat or species-specific surveys should be agreed with Natural England, the EA and the county ecologist, as appropriate, in advance of the surveys being undertaken. In its consultation response Natural England has identified a number of ecological surveys they advise be undertaken. These surveys will particularly support assessment of impact on designated sites. The EA has also identified the potential need for species-specific surveys to be undertaken for: white clawed crayfish; freshwater fish; freshwater pearl mussel; and hazel dormouse.	Survey scope and methods were discussed and agreed with stakeholders via the Onshore EWG. The desk study exercise confirmed that there was no requirement to undertake surveys for freshwater pearl mussel, hazel dormouse and red squirrel (see volume 6, annex 3.13: Hazel Dormouse, Red Squirrel and Freshwater Pearl Mussel Desk Study). This was agreed with the Onshore EWG. White clawed crayfish surveys were undertaken in 2017 and are reported in volume 6, annex 3.4: White Clawed Crayfish Survey.
December 2016	PINS - Scoping Opinion	Table 11.1 of the Scoping Report identifies designated sites potentially affected by the proposed development, including four European sites. Natural England at Annex 5 to its consultation response identifies a further two European sites to be considered: the North Norfolk Coast SAC; and The Wash and North Norfolk Coast SAC. Natural England has also identified a number of additional SSSIs to be considered in the impact assessment. All SSSIs along the Hornsea Three onshore cable corridor and any beyond this area where there are potential impact pathways between the proposed development and the designated site should be considered. The EA comment that there may be a need to obtain data for an area wider than the Hornsea Three onshore cable corridor given that no information has been provided in the Scoping Report to confirm how close to the limits of the area works will take place.	The North Norfolk Coast SAC is sufficiently distant from the Hornsea Three onshore 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 2, chapter 2: Benthic Ecology, chapter 3: Fish and Shellfish Ecology and chapter 4: Marine Mammals. Nationally designated sites within 2 km of the onshore elements of Hornsea Three with identified impact pathways have been considered in this assessment (section 3.11). See also the RIAA, which accompanies the DCO application (document reference A5.2), 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
December 2016	PINS - Scoping Opinion	A number of designated sites, including European sites, lie within the Hornsea Three onshore cable corridor. The development of the cable route should avoid impacts to designated sites where possible. This is an approach supported by Natural England and the EA 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). Natural England has suggested in its consultation response that the Evidence Plan process provides appropriate opportunity to support these discussions.	The onshore cable corridor selection process has avoided direct impacts on designated sites wherever possible by locating the onshore elements of Hornsea Three outside of these site boundaries (see volume 1, chapter 4: Site Selection and Alternatives). Where this was not possible (primarily where linear sites associated with rivers such as the River Wensum SAC cross the onshore cable corridor and it is not therefore possible to avoid them), Horizontal Directional Drilling (HDD) is proposed to pass beneath these sites. Effects on sites within the Hornsea Three onshore cable corridor have been assessed in section 3.11.
December 2016	PINS - Scoping Opinion	Natural England in its consultation response noted that the scope of the assessment of European sites and component SSSIs, including sensitive qualifying features, potential impacts and recommended surveys should be agreed with Natural England.	The scope of surveys and assessment discussed and agreed with the Onshore EWG.
December 2016	PINS - Scoping Opinion	The Yare Valley County Wildlife Site (CWS) has been identified as a designated site to be considered in the impact assessment. 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, should be taken into account.	HDD will be employed under the Yare Valley CWS and Algarthorpe Marshes CWS to avoid impacts on these sites (see chapter 2: Hydrology and Flood Risk and section 3.11 of this chapter (paragraph 3.11.1.141)).
December 2016	PINS - Scoping Opinion	The potential to spread invasive non-native species should be considered in the Environmental Statement, particularly where the proposed development affects aquatic habitats. Natural England have requested the inclusion of an invasive species protocol with the ES. The EA have also identified the need to identify biosecurity measures, and this is supported by the Secretary of State. The content and format for such a protocol should be discussed with Natural England and the EA prior to submission of the Environmental Statement.	Biosecurity measures are summarised in section 3.10 of this chapter and presented in the Outline EMP (document reference A8.6) and Outline Code of Construction Practice (CoCP) (document reference A8.5), both of which accompany the DCO application.
December 2016	PINS - Scoping Opinion	The EA have commented in respect of altered thermal and Electro-Magnetic Fields (EMF) impacts. The depths at which the onshore cables would be buried beneath watercourses and the potential for impacts associated with buried cables on sensitive species should be considered. The EA have also raised the need to consider potential impacts associated with the maintenance of the buried onshore cables. Potential impacts on species arising from potential thermal changes and EMFs during construction, operation and maintenance and decommissioning should be discussed with Natural England, the EA and county ecologist (as appropriate). Should it subsequently be agreed that such effects are screened out of the impact assessment; the Environmental Statement should provide a justification for doing so.	The thermal impacts of the underground cable are considered in chapter 1: Geology and Ground Conditions. The thermal effects of properly installed cables in a thermally stabilised layer will be undetectable more than 1.2 m from the cables in both horizontal and vertical planes, which is less than the buried depth of the cables beneath watercourses. The assessment of thermal impacts concluded that the impact would be of negligible magnitude and it is not therefore considered that there is any potential for impacts on ecological features. EMF is considered in volume 4, annex 3.3: EMF Compliance Statement. Effects associated with EMF on offshore ecological receptors are considered in volume 2, chapter 3: Fish and Shellfish Ecology, chapter 4: Marine Mammals and chapter 6: Commercial Fisheries. With respect to onshore ecology, it is noted that the desk study and site-specific surveys have not identified species present that are known to be particularly sensitive to EMF (such as salmon). Furthermore, EMFs reduce rapidly over a short distance (see volume 4, annex 3.3: EMF Compliance Statement) and are widely present within the study area associated with existing cables, overhead lines etc. On the basis of the information contained within annex 3.3, it is not considered that significant effects on onshore ecological receptors are likely. Ecological impacts associated with the operation and maintenance phase are assessed in section 3.11.
December 2016	PINS - Scoping Opinion	Table 11.8 of the Scoping Report states that the PEA surveys will be used to inform decommissioning impacts. At the point of decommissioning these surveys will be significantly out of date and further data collection and/or re-surveys are likely to be required prior to decommissioning to inform potential decommissioning impacts and any necessary mitigation. Additional surveys/resurveys for decommissioning should therefore be carried out.	Further surveys will be carried out to update available information prior to decommissioning (see section 3.11.3).
December 2016	PINS - Scoping Opinion	The use and feasibility of HDD techniques should be considered where significant impacts on sensitive habitats/sites/species cannot be avoided.	The use of HDD is proposed for all 'main' and numerous 'ordinary' watercourses and other key habitats, such as woodland. All designated sites within the onshore cable corridor that could not be avoided are being crossed using HDD. The assessment of effects set out in section 3.11 takes this into account.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
December 2016	PINS - Scoping Opinion	The list of potential cumulative projects at paragraph 11.1.22 of the Scoping Report is broadly defined by type. Natural England set out in its consultation response concerns with regard to cumulative impacts. 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 scope of potential cumulative impacts should be discussed and agreed with Natural England during the pre-application stage.	A cumulative assessment is presented in section 3.1.3. Cumulative effects on ecology and nature conservation with Norfolk Vanguard in particular are considered in paragraph 3.13.2.14 to 3.13.2.19.
December 2016	PINS - Scoping Opinion	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). If applicants consider it likely that notification may be necessary under action s28(I), any issues with the relevant nature conservation body 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 Environmental Statement. The application documents submitted in accordance with Regulation 5(2)(I) could also provide this information. Applicants should seek to agree with the nature conservation body the DCO requirements which will provide protection for the SSSI before the DCO application is submitted.	Noted. Designated sites, including SSSIs, are identified in section 3.7 of this chapter. Section 3.11 provides an assessment of effects on all designated sites. No significant effects on SSSIs have been identified.
December 2016	PINS - Scoping Opinion	The decision maker under the Planning Act 2008 has, as the competent authority, 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 authority 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.	Protected species surveys have identified likely licence requirements associated with Hornsea Three. Natural England has been consulted via regular Onshore EWG meetings and there are no known issues that would prevent an EPS license being granted. Effects on protected species are set out in section 3.11 of this chapter.
December 2016	PINS - Scoping Opinion	If an applicant has concluded that an EPS licence is required the Examining Authority 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.	
December 2016	PINS - Scoping Opinion	Applicants are encouraged to consult with Natural England and the Marine Management Organisation (MMO) and, where required, agree appropriate requirements to secure necessary mitigation. It would assist the examination if applicants could provide, with the application documents, confirmation from Natural England and the MMO whether any issues have been identified which would prevent the EPS licence being granted.	Natural England and MMO have been consulted via regular Onshore EWG meetings. This has included agreement of the scope of all surveys. There are no known issues that would prevent an EPS license being granted.
December 2016	PINS - Scoping Opinion	Generally, Natural England 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, Natural England will assess a draft licence application in order to ensure that all the relevant issues have been addressed. Within 30 working days of receipt, Natural England 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 Natural England 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 Natural England.	Protected species surveys have identified likely licence requirements. The results of the surveys undertaken are reported in section 3.7 of this chapter and set out in volume 6, annexes 3.1 to 3.13. Pre-construction surveys will be undertaken, where required, to update survey information.
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 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.	
December 2016	PINS - Scoping Opinion	In England the focus concerns the provision of up to date survey information which is then made available to Natural England (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.	

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
November 2016	Environment Agency – Scoping Response	The Environment Agency 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 proposed for the onshore elements of Hornsea Three are summarised in section 3.10 of this chapter and presented in the Outline EMP (document reference A8.6) and CoCP (document reference A8.5), which accompany the DCO application.
November 2016	Environment Agency – Scoping Response	Paragraph 4.2.22 of the Scoping Report states that it should avoid “areas of ancient woodland habitat or other woodland of conservation interest”. It should be noted that not only woodland hold 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 value 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 Hornsea Three intertidal area, the Hornsea Three onshore cable corridor and the HVAC booster station.	Priority (UKBAP) and LBAP habitats are considered in the assessment section of this chapter (section 3.11).
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.	The onshore cable corridor selection process has avoided direct impacts on designated sites wherever possible by locating the onshore cable corridor outside designated site boundaries (see volume 1, chapter 4: Site Selection and Alternatives). Where this was not possible (primarily for linear sites associated with rivers such as the River Wensum SAC which cross the onshore cable corridor), HDD is proposed. The use of HDD is proposed for all ‘main’ and numerous ‘ordinary’ watercourses and other key habitats, such as woodland. All designated sites within the onshore cable corridor that could not be avoided are being crossed using HDD. The assessment of effects set out in section 3.11 takes this into account.
November 2016	Environment Agency – Scoping Response	Paragraph 11.1.5 of the Scoping Report 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 3.9: Onshore Ornithology – Wintering and Migratory Bird Survey). Several local groups were contacted for records. Following consultations, it was determined that RSPB and BTO records would be unlikely to add significant value to the data set. Available BTO data are 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 are no relevant Wetland Bird Survey WeBS data as this national survey of wetlands does not cover habitats within the Hornsea Three ecology and nature conservation study area. RSPB do not hold specific records and were consulted as part of the Onshore EWG.
November 2016	Environment Agency – Scoping Response	Paragraph 11.1.6 of the Scoping Report 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: <ul style="list-style-type: none"> • White clawed crayfish • Freshwater fish • Freshwater pearl mussel • Hazel dormouse 	Survey scope and methods have been discussed and agreed with stakeholders via the Onshore EWG. The desk study exercise confirmed no requirement to undertake surveys for freshwater pearl mussel, hazel dormouse and red squirrel (see volume 6, annex 3.3: Hazel Dormouse, Red Squirrel and Freshwater Pearl Mussel Desk Study). White clawed crayfish surveys were undertaken in 2017 and are reported in volume 6, annex 3.5: White Clawed Crayfish Survey. Freshwater fish surveys have been scoped out from the assessment process in consultation with the Onshore EWG.
November 2016	Environment Agency – Scoping Response	It is not specified how close to the edge of the Hornsea Three onshore cable 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 Hornsea Three onshore cable corridor.	As set out in section 3.3 of this chapter, the desk study used an initial search area of 2 km for sites of higher than County importance. For sites of County importance or below, the search area was 1 km unless an impact pathway was identified that could extend this distance. The assessment has focused on sites within 1 km of Hornsea Three and additional sites up to 2 km where an impact pathway was identified. Also see the RIAA (document reference A5.2) 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
November 2016	Environment Agency – Scoping Response	The potential of buried cables to impact on wildlife. The altered thermal and EMF 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 4, annex 3.3: EMF Compliance Statement. Effects associated with EMF on offshore ecological receptors are considered in volume 2, chapter 3: Fish and Shellfish Ecology, chapter 4: Marine Mammals and chapter 6: Commercial Fisheries. With respect to onshore ecology, it is noted that the desk study and site-specific surveys have not identified species present that are known to be particularly sensitive to EMF (such as salmon). EMFs reduce rapidly over a short distance (see volume 4, annex 3.3: EMF Compliance Statement) and are widely present within the study area associated with cables, overhead lines etc. It is not considered that significant effects on any of the identified receptors are likely.
November 2016	Environment Agency – Scoping Response	The impacts associated with the maintenance of the onshore buried cables if a fault should occur should be considered. 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 of this chapter.
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.	Habitat enhancement of hedgerows will be undertaken by replanting all removed hedgerows with a species-rich native mix.
November 2016	Environment Agency – Scoping Response	Resurveys at the time of decommissioning are required, as 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 are considered obsolete and must be re-surveyed.	Update surveys will be undertaken prior to decommissioning.
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 will be undertaken prior to decommissioning to update information regarding habitats and species effects during decommissioning are considered in section 3.11.3 of this chapter.
November 2016	Natural England – Scoping Response	The Hornsea Three onshore cable corridor and infrastructure has the potential to affect six internationally designated sites and several nationally designated sites. The assessment should include North Norfolk Coast SAC and The Wash and North Norfolk Coast SAC. The cable route and infrastructure should avoid all designated sites, including locally 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, potential installation options should be discussed during the Evidence Plan process and appropriate survey data and mitigation provided. 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 Hornsea Three onshore cable corridor with identified impact pathways have been considered in the assessment. See also RIAA (document reference A5.2) for assessment of impacts on European sites. All designated sites within the onshore cable corridor that could not be avoided are being crossed using HDD. The Hydrological characterisation work has been undertaken to investigate the links between hydrology and ecological habitats and is presented in volume 6, annex 2.4: Hydrological Characterisation Study. A summary of the work undertaken to date is provided in chapter 2: Hydrology and Flood Risk.
November 2016	Natural England – Scoping Response	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 have 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. Prior to any decisions on location a hydro-ecologist should be 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. Placement of the cable should be 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 main rivers has been completed and is presented in volume 6, annex 2.4: Hydrological Characterisation Study. 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 have been mapped and have been used to inform the principles of the crossing methodologies in these areas (a process that will continue into detailed design). The scope of the hydrological characterisation work was agreed with the Onshore EWG. A summary of the work undertaken to date is provided in chapter 2: Hydrology and Flood Risk.
November 2016	Natural England – Scoping Response	A qualifying species of the River 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 survey of Desmoulin's whorl snail was undertaken in 2017 and discussion of the results has been undertaken with the Onshore EWG prior to the reporting of results in volume 6, annex 3.3: Desmoulin's Whorl Snail Survey.

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November 2016	Natural England – Scoping Response	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, and Booton Common SSSIs. A desk study should be carried out to ensure that all SSSIs associated with this SAC that may be affected by the cable route are scoped into the assessment. The Environmental Statement should consider 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 main rivers has been completed and is presented in volume 6, annex 2.4: Hydrological Characterisation Study. 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 have been mapped and will be used to inform the design of the crossing methodologies in these areas (a process that will continue into detailed design). The scope of the hydrological characterisation work has been agreed with the Onshore EWG. A summary of the work undertaken to date is provided in chapter 2: Hydrology and Flood Risk.
November 2016	Natural England – Scoping Response	The proposed corridor and infrastructure sites may have a direct effect on interest features of the North Norfolk Coast SPA, Ramsar and SAC, or 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).	The scope of wintering and migratory bird surveys has been agreed with the Onshore EWG. Results are presented in volume 6, annex 3.9: Onshore Ornithology – Wintering and Migratory Birds. Effects on designated sites are set out in section 3.11 of this chapter. See also the RIAA that accompanies the DCO application (see document reference A5.2).
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. Therefore, full breeding bird surveys should be undertaken along the full length of the route and mitigation provided accordingly. Also, 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.	The scope of breeding bird surveys has been discussed and agreed via the Onshore EWG. The results are presented in volume 6 annex 3.10: Onshore Ornithology – Breeding Bird Survey. Mitigation measures forming part of Hornsea Three are set out in Table 3.19. These include restoration of habitats post-construction. Cawston and Marsham Heaths, Foxley Wood, Honeypot Wood and Beetley and Hoe Meadows SSSIs were associated with the eastern onshore cable corridor option included at scoping stage but subsequently not selected, and therefore these are not affected and there is no requirement to assess these sites in the Environmental Statement.
November 2016	Natural England – Scoping Response	All nationally designated sites within the cable route area should be given consideration. 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 Hornsea Three onshore cable corridor with identified impact pathways have been considered in the assessment. Details of the sites are provided in section 3.7 of this chapter. The assessment of effects is set out in section 3.11. Mitigation measures forming part of Hornsea Three are set out in Table 3.19.
November 2016	Natural England – Scoping Response	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.	Designated sites within 2 km of the Hornsea Three onshore cable corridor with identified impact pathways have been considered in the assessment. Where possible, the onshore cable corridor selection process has avoided designated sites. All designated sites within the onshore cable corridor that could not be avoided are being crossed using HDD. Sites designated for the geodiversity value are considered in chapter 1: Geology and Ground Conditions.
November 2016	Natural England – Scoping Response	Consideration should be given to avoiding impacts of invasive non-native species. The cable route will 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. 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, an invasive species protocol should be included in the Environmental Statement. There is also potential to pollute rivers during construction or maintenance and the Environmental Statement should explain how it is intended to avoid these issues and to include a Construction Environmental Management Plan (CEMP) to protect the river from pollution during works.	Biosecurity and pollution control measures are summarised in section 3.10 of this chapter and in chapter 2: Hydrology and Flood Risk respectively. Further details are presented in the Outline EMP (document reference A8.6) and Outline CoCP (document reference A8.5) that accompany the DCO application.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
November 2016	Natural England – Scoping Response	<p>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. Records of protected species should be 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. Natural England has adopted standing advice for protected species which includes links to guidance on survey and mitigation.</p> <p>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 should be assessed. Section 40 of the NERC Act 2006 places a general duty on all public authorities, including local planning authorities, to conserve and enhance biodiversity.</p>	<p>The scope of species surveys has been discussed and agreed via the Onshore EWG.</p> <p>The assessment of effects on habitats and protected and other species is included in section 3.11. The results have been discussed with the EWG prior to the reporting of results in the Environmental Statement.</p>
February 2017	<p>Onshore Expert Working Group – Natural England</p> <p>Norfolk County Council</p> <p>Norfolk Wildlife Trust</p> <p>RSPB</p> <p>Environment Agency – Meeting</p>	<p>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.</p> <p>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.</p> <p>Presentation of the Preliminary Ecological Appraisal and the proposed protected species surveys.</p> <p>Presentation and agreement of the survey methodologies for the protected species surveys.</p> <p>Approach and scope of hydrology characterisation report discussed.</p>	<p>Meeting for information sharing purposes. The scope of proposed surveys was discussed and agreed via the Onshore EWG. The findings are summarised in section 3.7 of this chapter and set out in volume 6, annexes 3.1 to 3.13.</p> <p>Hydrological characterisation of the proposed crossing locations of main rivers has been completed and is presented in volume 6, annex 2.4: Hydrological Characterisation Study. A summary of the work undertaken to date is provided in chapter 2: Hydrology and Flood Risk.</p>
April 2017	Onshore Expert Working Group - Meeting	<p>Presentation of the results of the wintering bird survey and habitat classification surveys. Agreement of assessment approach for surveys completed.</p> <p>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.</p> <p>Identification and discussion of non-statutorily designated ecological sites within 2 km data search area.</p> <p>Update on other protected species surveys and the findings to date.</p> <p>Update on the work undertaken for the hydrological characterisation report.</p>	<p>Meeting for information sharing purposes. The scope of proposed surveys was discussed and agreed via the Onshore EWG. The findings are summarised in section 3.7 of this chapter and set out in volume 6, annexes 3.1 to 3.13.</p> <p>Hydrological characterisation of the proposed crossing locations of main rivers has been completed and is presented in volume 6, annex 2.4: Hydrological Characterisation Study. A summary of the work undertaken to date is provided in chapter 2: Hydrology and Flood Risk.</p> <p>The desk study exercise confirmed no requirement to undertake surveys for freshwater pearl mussel, hazel dormouse and red squirrel (volume 6, annex 3.13: Hazel Dormouse, Red Squirrel and Freshwater Pearl Mussel Desk Study).</p>
June 2017	Broadland District Council and Norfolk County Council - Meeting	<p>Project progress update, providing a summary of the information contained in the Environmental Statement, including the baseline information presented, and the approach to the assessment for onshore topics, and planned engagement activities through 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.</p>	<p>Findings of the EIA process, in accordance with the discussions, are set out within this chapter. The Outline EMP (document reference A8.6) is provided as part of the DCO application.</p>
June 2017	South Norfolk Council and North Norfolk District Council – Meeting	<p>Project progress update, providing a summary of the information contained in the Environmental Statement, including the baseline information presented, and the approach to the assessment for onshore topics, and planned engagement activities through 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.</p>	<p>Hornsea Three onshore cable corridor refinement since this consultation has allowed avoidance of statutory designated sites in the majority of cases, with the exception of the River Wensum SAC/SSSI which will be crossed with HDD. Non-statutory sites (CWSS) have also been avoided wherever possible, and where this was not possible HDD will be employed.</p> <p>Corridor refinement has also resulted in the proposal for HDD beneath all ‘main’ and numerous ‘ordinary’ watercourses. Findings of the EIA process, in accordance with the discussions, are set out within this chapter. Construction measures are set out in the Outline CoCP that accompanies the DCO application (document reference A8.5). The Outline EMP is provided as part of the DCO application (document reference A8.6).</p>

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August 2017	Environment Agency – Section 42 Response	Concern was raised about how the Water Framework Directive (WFD) is to be assessed, the protection of groundwater resources, safeguarding white clawed crayfish populations, beach processes where the cable makes landfall and, assessment of the potential for contaminated land. Advisory notes in respect of flood risk assessments and flood risk activity permits were provided.	Detailed WFD assessment works are presented in volume 6, Annex 2.5: Water Framework Directive Surface Water Assessment. Refer to chapter 1: Geology and Ground Conditions for contaminated land assessment. Refer to volume 2, chapter 1: Marine Processes for beach processes. All watercourses with known white clawed crayfish populations would be crossed using HDD (see section 3.10). Haul roads across some of these tributaries are required, which will involve minimal habitat loss, to be restored following completion of works. Measures to be taken during HDD in relation to handling of bentonite and the requirement for plans to be produced for HDD beneath watercourses (to minimise the risk of pollution) are included in the Outline CoCP (document reference A8.5).
September 2017	Environment Agency – Section 42 Response	Water Biodiversity: Records of white clawed crayfish are known from the River Glaven, including the headwaters both upstream and downstream of the onshore cable corridor and it is possible that this species occurs within the onshore cable corridor search area and hence within watercourses or ditches that would be directly affected by cable installation. It is known that there are white clawed crayfish present in the Hempstead watercourse, and so HDD should also be the method of crossing in this location.	HDD is proposed for all 'main' and numerous 'ordinary' watercourses, including those where white clawed crayfish are known to be present (see section 3.10). Haul roads across some of these tributaries are required, which will involve minimal habitat loss, to be restored following completion of works. Biosecurity measures are summarised in section 3.10 of this chapter and set out in the Outline EMP that accompanies the DCO application (document reference A8.6).
September 2017	Environment Agency – Section 42 Response	White clawed crayfish are present within the River Tud. It is likely signal crayfish are also present in the lower Tud due to the proximity of the Wensum confluence and no barriers to prevent their upstream movement into the Tud. HDD is preferred where crossing the Tud and other sensitive land parcels but due consideration and mitigation should be given to groundwater effects.	This chapter has been amended to include reference to white clawed crayfish being present in the River Tud. HDD is proposed for all 'main' and numerous 'ordinary' watercourses, including those where white clawed crayfish are known to be present (see section 3.10).
September 2017	Environment Agency – Section 42 Response	The Weybourne/Spring Beck and the Hempstead Stream (Glaven headwater) contain white clawed crayfish. These watercourses should be reconsidered for HDD due to their high sensitivity. A clear explanation as to why trenching is chosen over other crossing methods is required together with a method statement detailing the trenching methodology. It will be necessary to ensure minimal disturbance to the environment, including detailing pollution prevention measures, protected species surveys (as appropriate) and undertaking work at the correct time of year. Opportunities to enhance habitat around the trenching should be sought and detailed as part of the project. The mitigation hierarchy should be born in mind when considering movement of white clawed crayfish, this should be planned to be avoided. Adequate biosecurity measures should be in place when surveying	Weybourne / Spring Beck is no longer located within the onshore cable corridor for Hornsea Three. Hempstead Stream, other Glaven tributaries and all watercourses including those where white clawed crayfish have been recorded are proposed to be crossed using HDD. Haul roads across some of these tributaries are required, which will involve minimal habitat loss, to be restored following completion of works. The Outline CoCP (document reference A8.5) outlines measures to be taken to minimise risks from HDD and a protocol for non-native species is also provided. Biosecurity measures are summarised in section 3.10 of this chapter and set out in the Outline EMP (document reference A8.6) that accompanies the DCO application. Hedgerow enhancements are provided, with all hedgerows removed for trenching replanted with a species-rich native mix regardless of prior condition.
September 2017	Environment Agency – Section 42 Response	The maximum design scenario would have intermittent impacts of habitat loss and it may be necessary to relocate crayfish from watercourses on up to three occasions. Exclusion of crayfish from the works area for the full duration of the maximum construction programme is not feasible or desirable as it would serve to isolate populations on either side of the onshore cable corridor. Translocation of crayfish, if required, would be carried out under licence from Natural England. Crayfish would need to be relocated into areas of suitable habitat up or downstream of the affected watercourses, enabling re-colonisation of the affected habitat post-restoration.	The maximum design scenario has been reduced from three to two phases, which will reduce this impact. All watercourses where white clawed crayfish have been recorded are now proposed to be crossed using HDD, so translocation of white clawed crayfish will not be necessary.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
September 2017	Norfolk County Council – Section 42 Response	Ecological connectivity should be maintained throughout the construction phases between the designated sites of Alderford Common SSSI, the River Wensum SAC and the area to the south. This connectivity is particularly important for bats, as there are known bat roosts in the area, including those of Barbastelle bats in the woodland in Morton-on-the-Hill. Minimal disruption of features used by bats for feeding and commuting should be designed into the construction process.	Connectivity within the Alderford SSSI, the River Wensum and the areas to the south would be maintained via the proposed sections of HDD. One section of HDD would maintain connectivity across the onshore cable corridor from the south west corner of Alderford Common along watercourses to Bush Meadow Plantation and the River Wensum. Further south, HDD under Marriott's Way CWS would retain connectivity in this location, and HDD will also be undertaken under the Wensum itself and hence retain connectivity between Morton and Attlebridge. Therefore, the ability of bats to disperse e.g. between Alderford Common & Morton Plantation would not be affected. HDD locations and ecological constraints are shown on Figure 3.2.
September 2017	Natural England – Section 42 Response	The integrity of internationally designated sites and EPS extends beyond site boundaries to habitats and features which support the site function and species population. Impacts on catchments, functionally linked habitats and corridors are therefore relevant and should be considered more explicitly.	The assessment of effects on the integrity of internationally designated sites is set out in the RIAA (document reference A5.2). The assessment provided in this chapter (section 3.11) for EPS has included consideration of effects beyond the site boundary (e.g. fragmentation) where appropriate.
September 2017	Natural England – Section 42 Response	The movement of people and equipment between sites could spread disease and invasive species. Appropriate biosecurity and work phase planning will be needed to avoid the risk of spreading disease and invasive species into areas currently free or at low risk from these. This is particularly important with white clawed crayfish and crayfish plague where the works cover refuge populations of white clawed crayfish as well as areas where signal crayfish and crayfish plague are present. More widely all plant and animal diseases and invasive species should be surveyed for and measures put in place to prevent their spread and where possible eradication from work areas. There is likely to be a similar issue around agricultural pests and diseases. Therefore, it is very important that an invasive species protocol is included in the Environmental Statement.	HDD is proposed for all 'main' and numerous 'ordinary' watercourses, avoiding the need for trenching in these locations, including those where white-clawed crayfish are known or assumed to be present (River Glaven tributaries, River Tud and River Yare). A protocol for non-native species and biosecurity is provided in the Outline CoCP (document reference A8.5) and the Outline EMP (document reference A8.6) that accompany the DCO application.
September 2017	Natural England – Section 42 Response	The impact extent, duration and reversibility of the works on protected sites and species are not certain and should not be assumed without appropriate survey results and site and activity specific monitoring and mitigation details.	The ecology assessment provided in this chapter of the Environmental Statement is based on a suite of ecology surveys undertaken in 2017. This is considered sufficient to inform the EIA process.
September 2017	Natural England – Section 42 Response	While it is accepted that 'HDD is unlikely to significantly affect white-clawed crayfish from either direct habitat loss or disturbance during HDD operations' in a strictly limited context, the impacts of sediment generated from any aspect of the works, including launch and exit pits and vehicle routes entering watercourses are likely to negatively impact on white clawed crayfish habitat and that of other aquatic invertebrates.	HDD has been selected to reduce the potential for impacts as far as possible. Measures to reduce and avoid impacts from HDD and other construction activities are set out in section 3.10 of this chapter, with further details of proposed control measures provided in the Outline CoCP (document reference A8.5).
September 2017	Natural England – Section 42 Response	Temporary amphibian fencing is used to act as a barrier to movements of great crested newts in their terrestrial phase. This includes preventing newts from reaching an area subject to potentially harmful construction activities. Given that temporary amphibian fencing would normally only be erected where there is a reasonable likelihood of encountering great crested newts, fence installation would be deemed a deliberate intervention and as would be considered a licensable activity.	Noted. All temporary amphibian fencing would be installed under licence.
September 2017	Natural England – Section 42 Response	The ES should make clear whether a licence is intended to be applied for, for water voles.	Water vole works would be carried out under licence if needed but no known watercourses supporting water voles would be directly affected. Further details are provided in section 3.11 of this chapter.
September 2017	Natural England – Section 42 Response	Badgers are relatively tolerant of moderate levels of noise and activity around their setts and low or moderate levels of apparent disturbance at or near to badger setts do not necessarily disturb the badgers occupying those setts. The requirement for a licence should therefore be assessed on the predicted level of disturbance which development works would cause, rather than the distance it occurs from an active sett.	Noted. This will be taken into consideration, if licensing is required.

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September 2017	Natural England – Section 42 Response	Dust is not only a potential issue in itself but may also carry nutrients and pollutants, similar to runoff. This could have greater impact on ecological receptors than the dust <i>per se</i> and this should be recognised. Where dust settles it will have the potential to runoff into watercourses with impacts as for runoff, but potentially away from any mitigation or monitoring and so onsite control, including all exposed soils, will be vital.	The air quality assessment set out in chapter 9: Air Quality has noted that onshore elements of Hornsea Three are within close proximity to a number of ecological sites and has classified the surrounding area as highly sensitive regarding the impact on ecological receptors. The chapter sets out proposed mitigation derived from guidance published by the Institute of Air Quality Management (IAQM). The IAQM guidance states that with good dust management and mitigation practises implemented, the residual effects will normally be reduced to a level that is "not significant". All of the mitigation measures relate to methods of preventing dust (and associated nutrients/ pollutants) from leaving the site. Further details of measures proposed to control runoff are set out in chapter 2: Hydrology and Flood Risk and in the Outline CoCP (document reference A8.5).
September 2017	Natural England – Section 42 Response	Natural England agrees that overwintering pink-footed goose should be considered further in the EIA and HRA and advises that possible measures such as working window and crop rotation could be potential mitigation measures.	Effects on pink-footed goose are set out in section 3.11. Offshore effects on wintering and migratory birds are assessed in volume 2, chapter 5: Offshore Ornithology; and the RIAA which accompanies the DCO application (document reference A5.2). Measures proposed to reduce effects on pink-footed goose are discussed in sections 3.10 and 3.11.
September 2017	RSPB – Section 42 Response	The use of HDD for landfall cable laying would be preferable.	At the landfall area, Hornsea Three may use HDD or open trenching from Mean Low Water to the Norfolk Coast Path. A decision on which technique to use will be made during detailed design based on further technical information. The assessments presented in this chapter, and in related chapters assess the maximum design scenario for each particular receptor.
September 2017	RSPB – Section 42 Response	The RSPB note the maximum installation duration of 30 months and hope that this will allow for suitable scheduling of works to avoid the most sensitive areas at the points of the year when the relevant receptors are present.	Although the installation of the onshore cable is expected to take up to 30 months in total, work is expected to progress along the route with a typical works duration of three months at any particular location (see volume 1, chapter 3: Project Description). As such the duration of activities at the most sensitive areas would be significantly less than the maximum installation duration of 30 months, although the exact timing of impacts would be determined during detailed design. Notwithstanding this, mitigation measures for works in sensitive areas will be employed as appropriate (see Table 3.19)
September 2017	RSPB – Section 42 Response	Measures should be put in place to manage any reptiles that may enter the trench whilst it is open.	The Outline EMP that accompanies the DCO application (document reference A8.6) contains measures to mitigate impacts on reptiles, including ensuring they are protected from risk of injury or death during cabling works that affect areas of reptile habitat.
September 2017	RSPB – Section 42 Response	The RSPB notes that pink-footed geese foraging near the landfall area will be the main concern. The survey work has identified a significant proportion of the North Norfolk Coast SPA population of pink-footed geese. It will be important to consider appropriate mitigation to maintain the levels of food available to foraging geese. The RSPB is keen that the bird scarers proposed to deter ground nesting birds are not used in areas that could support pink-footed geese in the early part of the potential breeding season (i.e. February) as they could have a wide impact that displaces birds over a large area.	Bird scarers will not be employed north of High Kelling in February, and this has been written in to the Outline EMP (document reference A8.6). The need for mitigation requirements will depend on the amount of sugar beet fields in the wider area, and on whether the fields crossed by the cable are planted with sugar beet at the time the cabling works take place. Mitigation measures are set out in Table 3.19 and the RIAA which accompanies the DCO application (document reference A5.2).
September 2017	RSPB – Section 42 Response	There is the potential that SPA and SAC features do not align with the SSSI features. Consequently the RPSB considers it is important to ensure that the SPA/SAC features are not taken as representative of the SSSIs. The RSPB recommends a review that demonstrates that the features are aligned, and which highlights where there are differences. In some areas, some SSSI features may now be of international importance and we are keen to see this reflected.	The features of both the international and national sites have been identified and considered. Where sites overlap, in general, the highest level of sensitivity has been assigned in this assessment (section 3.11).
September 2017	RSPB – Section 42 Response	The RSPB are not convinced that the River Wensum SAC and SSSI designations should be treated differently. If the SAC is deemed to be adversely affected then it indicates that significant impacts could also occur to the SSSI.	
September 2017	RSPB – Section 42 Response	The RSPB notes that the measures proposed generally appear to be appropriate, but we consider that there needs to be a focus on net gains to biodiversity as the project continues to be refined as these have had less attention at these earlier stages.	Habitat enhancement of hedgerows will be undertaken by replanting all removed hedgerows with a species-rich native mix.

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September 2017	RSPB – Section 42 Response	Whilst pink-footed geese have been observed in fields with a tractor the situation would be different if people were walking about outside the vehicle. During cable laying it must be assumed that there will be people walking around outside vehicles, and therefore the RSPB do not consider it appropriate to assess the impact on the basis that all staff will be within vehicles.	Noted. The assessment of potential impacts set out in Section 3.11 takes into account all activities which would take place, including vehicle movements and pedestrian movements within the working area.
September 2017	RSPB – Section 42 Response	It is important to consider what the effect of displacing pink-footed geese from sugar beet fields is likely to be. As discussed at the Onshore EWG, the RSPB recommend the planting of alternative sugar beet fields to give displaced pink-footed geese an alternative food source during the winter months.	Effects on pink-footed goose are set out in section 3.11. Offshore effects on wintering and migratory birds are assessed in volume 2, chapter 5: Offshore Ornithology; and the Report to Inform Appropriate Assessment (RIAA) which accompanies the DCO application (document reference A5.2).
September 2017	RSPB – Section 42 Response	The RSPB agrees that the numbers of birds are not high, so we accept that the impacts are likely to be limited. However, we consider that it would be extremely helpful to identify what measures can be put in place after construction to ensure that the area remains important for birds and can deliver more for the identified species of conservation concern.	Habitat restoration will be undertaken, including enhancement of hedgerows by replanting all removed hedgerows with a species-rich native mix. Post-construction there will be no permanent loss of habitat suitable for wintering pink-footed goose in the Kelling / Weybourne area where this species is known to forage.
September 2017	RSPB – Section 42 Response	Material to be used for surfacing tracks should be inert. In addition, any runoff from the tracks must be managed to ensure that it does not introduce contamination into watercourses.	Measures to control impacts from construction, including access tracks, are detailed in the Outline CoCP (document reference A8.5).
September 2017	RSPB – Section 42 Response	The RSPB considers that, subject to confirming the specific details in relation to pink-footed geese mitigation, that this approach appears to be appropriate.	Noted.
September 2017	RSPB – Section 42 Response	The RSPB notes that there will be habitat loss. Although this may only be small areas in any one location, collectively the loss could be significant. The RSPB considers that ways to recreate habitat to provide a net gain for wildlife from the project should be explored.	Habitat enhancement of hedgerows will be undertaken by replanting all removed hedgerows with a species-rich native mix.
September 2017	RSPB – Section 42 Response	The RSPB considers that further consideration of mitigation for pink-footed geese is required. It is also important that hydrological impacts arising from the scheme are properly considered: currently the hydrological assessment is looking at surface flows, but the big issue could actually be below ground where the cable and trench cut through the soil and potentially also below ground flows, which can be highly important for wetland sites. The RSPB considers that the focus on surface flows does not adequately deal with sites such as Booton Common that will be adjacent to the cable route.	The mitigation measures proposed as part of the onshore elements of Hornsea Three and the assessment of effects for pink-footed geese are provided in sections 3.10 and 3.11 respectively. Drainage would be installed either side of the Hornsea Three onshore cable corridor to ensure that existing land drainage flow is maintained, altered and channelled by the corridor. Effects on drainage and flood risk were assessed as being of no higher than minor adverse significance. For further details of proposed runoff control measures and the assessment of effects on hydrology refer to volume 2, chapter 2: Hydrology and Flood Risk. Groundwater flows are considered in volume 2, chapter 1: Geology and Ground Conditions, and no effects from cabling or HDD on groundwaters above minor negative adverse significance were identified.
September 2017	RSPB – Section 42 Response	The RSPB notes that the ecological mitigation measures will form part of the Code of Construction Practice and the Outline EMP that will accompany the final Environmental Statement. The RSPB looks forward to the opportunity to work with Orsted on the preparation of these documents to ensure that our concerns about pink-footed geese, and impacts on hydrology and Kelling Heath are addressed.	The Outline EMP (document A8.6) and CoCP (document reference A8.5) are provided as part of the DCO application. Final, more detailed, documents will be developed prior to construction.
September 2017	Edgefield, Bodham, Corpusty & Saxthorpe, Hempstead and Plumstead Parish Councils (and others) – Section 42 Response	The joint response raised concerns about permanent damage to the natural environment, including habitat loss (hedgerows, hedge margins, meadow, wet and ancient woodland), associated habitat fragmentation and the high potential for water pollution (due to soil and nutrient loss to watercourses).	The impacts on ecology and nature conservation are assessed within this chapter (section 3.11). Survey scope and methods were discussed and agreed with stakeholders via the Onshore EWG. For further details of proposed runoff control measures and the assessment of effects on hydrology refer to volume 2, chapter 2: Hydrology and Flood Risk.
September 2017	Edgefield, Bodham, Corpusty & Saxthorpe, Hempstead and Plumstead Parish Councils (and others) – Section 42 Response	To mitigate any environmental impact on the River Bure and surrounding ancient hedgerows, it is requested that HDD under-drilling be utilised for approximately 600 m length at an appropriate depth below the base of the water well.	The proposed HDD crossing for the River Bure commences in arable fields north of the river and runs through to arable fields just south of the Dismantled Railway CWS. The proposed length of the HDD is considered sufficient to avoid direct land take from designated sites and protected habitats. This includes the Bure, Heath Road, Dismantled Railway and all water meadows associated with the River Bure corridor. The depth of the HDD will be agreed during the detailed design stage. Further details are provided in volume 1, chapter 3: Project Description.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
September 2017	Swardston Parish Council – S42 Response	Substantial tree planting will take place to reduce the visual impact of the substation. The proposed site already contains a number of ancient hedgerows and mature trees. All necessary steps should be taken to ensure that these trees and hedgerows are protected.	Permanent and temporary land take for the construction of the onshore HVAC booster station is within arable land and will not result in loss of woodland or hedgerows.
September 2017	East Carleton & Ketteringham Parish Council – S42 Response	East Carleton & Ketteringham Parish Council considered the initial surveys and PEIR at its meeting on 17th August 2017. There are many trees within the pathway of the proposed onshore cable corridor and a particular concern was raised about oak trees in Cantley Lane. The parish council would like to see the impact on trees minimised and any tree protection orders respected when the exact details of the onshore cable corridor are finalised.	The Hornsea Three onshore cable corridor has been selected to minimise losses of hedgerows and trees wherever practicable. HDD is proposed for Cantley Lane (South). Where loss of hedgerows and trees is unavoidable, replacement planting with appropriate native species will be implemented.
September 2017	The Wildlife Trust (joint response from Norfolk WT and TWT) – S42 Response	The Trusts are pleased to see trenchless techniques being considered at major watercourses and at designated sites such as Kelling Heath and River Wensum and that this will also be considered for other watercourses, such as Glaven and Tud and at Local Wildlife Sites. Although this has been considered for non-designated watercourses in relation to impacts on otter and water vole, it is also important with regard to prevention of silt runoff into watercourses. For this reason, the use of trenchless crossings should be used wherever possible and feasible for all watercourses that may connect with sensitive wildlife sites (with regard to the geomorphology and hydrology of the underlying substrate).	HDD is proposed under all 'main' watercourses and numerous 'ordinary' minor watercourses in order to reduce potential impacts.
September 2017	The Wildlife Trust (joint response from Norfolk WT and TWT) – S42 Response	With regard to mitigation for impacts on protected species, the Trusts would like to see the option explored of working with Natural England to establish whether there is potential for using the development as a pilot for the roll out the new CGN licencing proposals and for this to include working with the Norfolk Pond Partnership.	This option will be explored prior to commencement. For the purposes of the Environmental Statement and Outline EMP (document reference A8.6) it has been assumed that standard GCN mitigation measures would be adopted, via an EPS licence application.
August 2017	Environment Agency – Section 42 Response	The Environment Agency is concerned about how the WFD is to be assessed, the protection of groundwater resources, safeguarding white clawed crayfish populations, beach processes where the cable makes landfall and, assessment of the potential for contaminated land.	Detailed WFD assessment works are presented in volume 6, annex 2.5: Water Framework Directive Surface Water Assessment. Refer to chapter 2: Hydrology and Flood Risk for assessment of flood risk, and chapter 1: Geology and Ground Conditions for contaminated land assessment. Refer to volume 2, chapter 1: Marine Processes for beach processes. All watercourses with known white clawed crayfish populations are proposed to be crossed using HDD.

3.6 Methodology to inform the baseline

3.6.1 Desktop study

3.6.1.1 Information on ecology and nature conservation within the desk study search area was collected through a detailed desktop review of existing studies and datasets. Full details of the organisations and individuals contacted to obtain ecological data are provided in volume 6, annex 3.1: Desk Study and Phase 1 Habitat Survey, and comprised:

- Natural England;
- NBIS;
- Norfolk Amphibian & Reptile Group (NARG);
- Amphibian and Reptile Conservation Trust;
- Norfolk Badger Protection Group;
- Norwich Bat Group;
- Norfolk Bat Group;
- Norfolk Barbastelle Study Group;
- Norfolk Badger Trust;
- County Badger Recorder;
- County Bat Recorder; and
- Norfolk Bats in Churches.

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

Identification of designated sites

3.6.1.3 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.

3.6.1.4 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.

3.6.1.5 All designated sites within the study area were identified using the three step process described below:

- Step 1: All designated sites of international, national and local importance within the ecology and nature conservation data search area were identified using a number of sources. These included the data requests listed above, and data collection from the JNCC website (www.jncc.defra.gov.uk) and the Department for Environment, Food and Rural Affairs (Defra) MAGIC website (www.MAGIC.defra.gov.uk).
- Step 2: Information was compiled on the relevant habitats and species for each of these sites.

- Step 3: Using the above information and expert judgement, sites were included for further consideration if:
 - A designated site directly overlaps with Hornsea Three; or
 - Sites and associated features were located within 1 km or had a potential impact pathway for impacts associated with the onshore elements of Hornsea Three.

3.6.1.6 Designated sites considered within the ecology and nature conservation assessment are identified in section 3.7.1.

3.6.2 Site specific surveys

3.6.2.1 In order to inform the EIA process, site specific surveys were undertaken, as agreed with the statutory consultees and local planning authorities via the Onshore EWG (see Table 3.5 for further details). A summary of the surveys undertaken to inform the ecology and nature conservation assessment is outlined in Table 3.6.

Table 3.6: Summary of site-specific survey data.

Title	Overview of survey	Survey contractor	Date	Reference to further information
Phase 1 Habitat Survey	A Phase 1 habitat survey 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 more detailed surveys.	RPS (2016) Thomson Ecology (2017)	June – October 2016 January – July 2017	Phase 1 habitat survey findings shown on Figure 3.2.
Invasive plant species subject to legal control	During the various field surveys carried out, evidence of any invasive plant species subject to legal control was recorded.	Thomson Ecology	2016 and 2017	Invasive species protocol is summarised in the Outline CoCP that accompanies the DCO application (document reference A8.5).
Hedgerow Survey	A detailed survey of hedgerows identified as being potentially species-rich during the Phase 1 habitat survey was undertaken to assess richness of woody species.	Thomson Ecology	June – July 2017	Volume 6, annex 3.2: Hedgerow Survey
Desmoulin's Whorl Snail Survey	Survey methodology agreed with Natural England and other key stakeholders as part of the Onshore EWG.	Thomson Ecology	Habitat suitability assessment: March 2017 Presence / absence survey: August 2017	Volume 6, annex 3.3: Desmoulin's Whorl Snail Survey
White Clawed Crayfish Survey	Survey methodology agreed with Natural England and other key stakeholders as part of the Onshore EWG.	Thomson Ecology	2017	Volume 6, annex 3.4: White Clawed Crayfish Survey
Great Crested Newt Survey	Survey methodology agreed with Natural England and other key stakeholders as part of the Onshore EWG.	Thomson Ecology	HSI: January – March 2017 eDNA and population size class surveys: April – June 2017	Volume 6, annex 3.5: Great Crested Newt Survey
Reptile Survey	Survey methodology agreed with Natural England and other key stakeholders as part of the Onshore EWG.	Thomson Ecology	April – September 2017	Volume 6, annex 3.6: Reptile Survey
Water Vole Survey	Survey methodology agreed with Natural England and other key stakeholders as part of the Onshore EWG.	Thomson Ecology	April – May 2017	Volume 6, annex 3.12: Water Vole Survey
Bat Surveys	Survey methodology agreed with Natural England and other key stakeholders as part of the Onshore EWG. Surveys undertaken include tree roost daytime and dusk emergence/dawn re-entry surveys, and commuting or foraging bat surveys.	Thomson Ecology	Bat Habitat Suitability Assessment: January – June 2017 Bat Activity Survey: June– October 2017 Bat Roost Survey: July – October 2017	Volume 6, annex 3.8: Bat Surveys
Onshore Ornithology – Wintering and Migratory Bird Survey	Survey methodology agreed with Natural England and other key stakeholders as part of the Onshore EWG.	Thomson Ecology	October 2016 – March 2017 October 2017 – February 2018	Volume 6, annex 3.9: Onshore Ornithology – Wintering and Migratory Bird Survey
Onshore Ornithology - Breeding Bird Survey	Survey methodology agreed with Natural England and other key stakeholders as part of the Onshore EWG.	Thomson Ecology	March – June 2017	Volume 6, annex 3.10: Onshore Breeding Bird Survey
Otter Survey	Survey methodology agreed with Natural England and other key stakeholders as part of the Onshore EWG.	Thomson Ecology	April – May 2017	Volume 6, annex 3.12: Otter Survey
Badger Survey	Survey methodology agreed with Natural England and other key stakeholders as part of the Onshore EWG.	Thomson Ecology	January – July 2017	Volume 6, annex 3.12: Badger Survey

Species not included in the assessment

- 3.6.2.2 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 assessment due to their absence from the survey areas and/or the likely absence of any effects. These species included freshwater and terrestrial invertebrates (with the exception of white clawed crayfish and Desmoulin’s whorl snail, which were surveyed as noted above) and all fish species (scoped out via consultation with the Onshore EWG).
- 3.6.2.3 A data search exercise was carried out which confirmed that there was no requirement to undertake surveys for freshwater pearl mussel, hazel dormouse or red squirrel (volume 6, annex 3.13: Hazel Dormouse, Red Squirrel and Freshwater Pearl Mussel Desk Study) as they are not considered to occur in Norfolk. This was discussed and agreed with the Onshore EWG held in April 2017.

3.7 Baseline environment

3.7.1 Designated sites

- 3.7.1.1 In total there are 16 onshore statutory designated sites located within 1 km of the onshore elements for Hornsea Three, and three additional statutory designated sites are located between 1 and 2 km. There are 60 non-statutory designated sites located within 1 km of the onshore elements of Hornsea Three and another 47 non-statutory designated sites located between 1 and 2 km. Marine designated sites are considered in volume 2, chapter 2: Benthic Ecology and chapter 4: Marine Mammals.
- 3.7.1.2 Designated sites within the study area are summarised in Table 3.7 and their locations are shown in Figure 3.2. Holt Lowes SSSI, which lies approximately 2 km from the Hornsea Three onshore elements, has also been included in the initial assessment of sites due to the existence of impact pathways that extend beyond the 1 km study area. These impact pathways include, for example, a hydrological connection, where the site is downstream of watercourses crossed by the onshore cable corridor.
- 3.7.1.3 Of the 16 designated statutory sites within the study area, three (River Wensum SAC, River Wensum SSSI and Kelling Heath SSSI) lie partially within the onshore cable corridor for Hornsea Three. Another SSSI, Alderford Common, lies immediately adjacent to the onshore cable corridor but not within it.
- 3.7.1.4 In addition, the following designated statutory sites lie in close proximity (<0.5 km) to the Hornsea Three onshore elements: North Norfolk Coast SAC/SPA/Ramsar/SSSI, Norfolk Valley Fens SAC / Booton Common SSSI and Weybourne Cliffs SSSI.
- 3.7.1.5 A summary of these statutory sites is provided below.
- North Norfolk Coast SPA / Ramsar site is designated for a range of bird species including wintering pink-footed goose;
 - Norfolk Valley Fens SAC comprises a series of geographically separate valley-head spring-fed fens. The two component SSSIs of the SAC which are close to or potentially affected by the Hornsea Three onshore cable corridor are:

- Holt Lowes SSSI (located downstream of the route on the river Glaven); and
- Booton Common SSSI (located close to the corridor downstream on Blackwater Drain).
- The River Wensum SAC / SSSI is designated for its riverine habitat and presence of white clawed crayfish, Desmoulin’s whorl snail, bullhead and brook lamprey;
- Alderford Common SSSI is situated close to the Hornsea Three onshore cable corridor and is primarily designated for presence of heathland and calcareous grassland; and
- Kelling Heath SSSI is primarily designated for heathland and associated species.

- 3.7.1.6 In addition, two Local Nature Reserves (LNR) were located within 1 km, Marston Marshes was located 0.16 km from the onshore cable corridor and Dunston Common was located 0.4 km from the onshore cable corridor.
- 3.7.1.7 The 60 non-statutory sites comprise 57 CWSs and three Roadside Nature Reserves (RNRs). Eleven non-statutory sites fall partially within the temporary or permanent land take for the onshore elements of Hornsea Three. These are listed in Table 3.7.
- 3.7.1.8 Sites designated for their geodiversity are considered in chapter 1: Geology and Ground Conditions.

Table 3.7: Designated sites within the ecology and nature conservation study area.

Designation	Name	Distance to onshore elements of Hornsea Three (km)
Statutory designations		
SAC	River Wensum	0.00
SAC	Norfolk Valley Fens	0.28
SPA	North Norfolk Coast	0.32
Ramsar	North Norfolk Coast	0.32
SAC	North Norfolk Coast	0.45
SAC	The Wash & North Norfolk Coast	0.56
SSSI	River Wensum	0.00
SSSI	Alderford Common	0.00
SSSI	Kelling Heath	0.00
SSSI	Edgefield Little Wood	0.25
SSSI	Booton Common	0.28
SSSI	North Norfolk Coast	0.32
SSSI	Weybourne Cliffs	0.37
SSSI	Weybourne Town Pit	0.82

Designation	Name	Distance to onshore elements of Hornsea Three (km)
LNR	Marston Marshes	0.16
LNR	Dunston Common	0.40
Non-statutory designations		
CWS	Algarsthorpe Marshes	0.00
CWS	Dismantled Railway	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	River Yare at Marlingford	0.00
CWS	Yare Valley (Marlingford)	0.00
CWS	Harman's Grove	0.00
CWS	Foxburrow Meadow	0.00
CWS	New Covert	0.00
CWS	Muckleburgh Hill	0.01
CWS	Salle Park	0.03
CWS	Melton Beck	0.08
CWS	Braymeadow	0.12
CWS	Pack Lane Meadow	0.12
CWS	Fir and Nineways Plantation	0.12
CWS	The Belt	0.13
CWS	Barningham Green Plantation	0.15
CWS	Corpusty Fen	0.18
CWS	Jenni's Wood	0.22
CWS	Beach Lane, Weybourne	0.22
CWS	Kelling Heath Park & 100 Acre Wood	0.24
CWS	Swardeston Common	0.26
CWS	Kelling Hard	0.27
CWS	Old Decoy, Selbrigg Pond, The Lows	0.29

Designation	Name	Distance to onshore elements of Hornsea Three (km)
CWS	Pasture at Easton College	0.32
CWS	Oak Grove	0.33
CWS	Wensum Pastures at Morton Hall	0.34
CWS	River Tud (west)	0.34
CWS	Pond Hills	0.36
CWS	Dunston Common	0.40
CWS	Beckhithe Meadow	0.43
CWS	Church Farm Marsh	0.48
CWS	Old Wood	0.49
CWS	Harold's Grove	0.50
CWS	Grassland at Saxthorpe	0.50
CWS	Salle Common and Adjacent Land	0.50
CWS	Church Hill Common	0.53
CWS	Hall Hills/Ringland Covert	0.57
CWS	Heydon Park	0.57
CWS	Land south of High Kelling	0.57
CWS	Ringland Hills	0.57
CWS	Broom and Spring Hills	0.59
CWS	Tan Office Farm	0.66
CWS	Cat Pits Wood	0.67
CWS	Caistor St. Edmund Roman Town	0.72
CWS	Intwood Carr	0.73
CWS	Moor Hall	0.76
CWS	Reepham Meadows	0.79
CWS	Yare Valley (Bawburgh)	0.80
CWS	Lake adjacent to Concrete Plant	0.81
CWS	Ketteringham Hall Lake	0.81
CWS	Lenwade Pits (East)	0.84
CWS	The Carrs Woodland	0.91
CWS	Pond Hills Meadows	0.91

Designation	Name	Distance to onshore elements of Hornsea Three (km)
RNR	U57217	0.04
RNR	U14319 Pond Hills	0.90
RNR	A140 (cutting)	0.97

3.7.2 Habitats and species

Habitats

Phase 1 habitat survey findings

- 3.7.2.1 Findings of the Phase 1 habitat survey are summarised below and are set out in more detail in volume 6, annex 3.1: Desk Study and Phase 1 Habitat Survey. Figure 3.2 identifies the key habitat types present. The Phase 1 Habitat Plan illustrates the dominant habitat types within and immediately adjacent to the onshore elements of Hornsea Three (namely the Hornsea Three landfall (above MHWS), the onshore cable corridor, the onshore HVAC booster station, the onshore HVDC converter/HVAC substation and the interconnection with the Norwich Main National Grid substation).
- 3.7.2.2 The majority of the surveyed area comprises cultivated land, much of which is under arable crops. Weybourne Hope shingle beach runs along the north of the Phase 1 habitat survey area. The Hornsea Three onshore cable corridor crosses the rivers Wensum, Bure and Yare and numerous ponds and several streams also occur within the survey area.
- 3.7.2.3 The Phase 1 habitat survey area intersects several villages including Kelling, High Kelling, Weybourne, Alderford, Attlebridge, Easton, Little Melton, Weston Longville, Lower East Carleton and Swardeston.
- 3.7.2.4 Several main arterial and private roads also traverse the survey area and many mixed-use farm buildings occur.
- 3.7.2.5 Table 3.8 lists the broad Phase 1 habitat types (as defined and described in JNCC, 2010)) recorded within the temporary or permanent land take for the onshore elements of Hornsea Three including their approximate total area.
- 3.7.2.6 The UKBAP habitat arable field margins (herbaceous strips or blocks around arable fields that are managed specifically to provide benefits for wildlife) occurs in some parts of the Hornsea Three onshore cable corridor where land managed under a Countryside Stewardship agreement (e.g. Kelling Estate). As the margins are typically narrow, the area of this habitat type has not been quantified.

Table 3.8: Approximate habitat areas identified within the footprint of onshore elements of Hornsea Three, compounds, storage areas and access roads during the Phase 1 habitat survey.

Habitat type	Approximate area (ha)														
	Onshore cable corridor (excluding areas crossed by HDD)	Onshore HVDC converter / HVAC substation (permanent land-take)	Onshore HVDC converter / HVAC substation (temporary works area)	HVAC booster station (permanent land-take)	HVAC booster station (temporary works area)	Crossing Point (where HDD is proposed)	Crossing Point (where HDD with haul road over is proposed)	Crossing Point (where HDD with haul road over or open cut is proposed)	Crossing point (where HDD and ducting laydown is proposed)	Landfall Construction Compound	Main Construction Compound	Secondary Construction Compound	Storage Areas	Access routes	Total
Broad-leaved plantation woodland	0.00					0.53	0.82								1.36
Broad-leaved semi-natural woodland	0.61			0.05		4.88	0.88		0.79					0.07	7.27
Coniferous plantation woodland						1.78									1.78
Coniferous semi-natural woodland	0.00					2.06	0.15							0.03	2.24
Mixed plantation woodland	0.11					2.57								0.05	2.74
Mixed semi-natural woodland						0.02	0.80							0.00	0.82
Dense scrub	0.05														0.05
Scattered scrub	0.65					0.31	0.04							0.01	1.01
Amenity grassland	0.02					0.03	0.00							0.00	0.06
Improved grassland	30.87					5.26	1.05	0.63	0.11	1.07			1.41	0.73	41.14
Marsh/marshy grassland	0.00					5.95	0.72							0.20	6.86
Poor semi improved grassland	10.16					5.70	1.44			1.93			1.05	0.58	20.86
Semi-improved neutral grassland	0.49					0.62	0.40						0.00	0.02	1.54
Arable	331.77	17.23	7.00	6.50	2.50	3.74	4.77	4.89	0.02			1.96	17.59	4.01	401.99
Bracken continuous	0.16														0.16
Ephemeral/short perennial	4.03					0.11	0.20			0.71			0.68	0.17	5.89
Tall ruderal	0.82					0.16	0.05	0.14							1.17
Shingle above high tide mark								1.84							1.84
Bare ground	3.47			0.01		1.28	0.35	0.18		0.46				0.84	6.58
Buildings	0.01					0.00									0.01
Hard surface	2.03	0.01				1.57	1.34	0.05			3.19		0.04	1.30	9.53
Unclassified	5.38	0.14	0.01	0.58		4.12	1.71	0.21					0.23	4.65	17.04
Total	390.62	17.39	7.01	7.13	2.50	40.70	14.74	7.94	0.92	4.17	3.19	1.96	21.00	12.66	531.92

Table 3.9: Approximate percentage of habitat areas identified within the footprint of onshore elements of Hornsea Three during the Phase 1 habitat survey.

Habitat type	Approximate area (ha)														
	Onshore cable corridor (excluding areas crossed by HDD)	Onshore HVDC converter / HVAC substation (permanent land-take)	Onshore HVDC converter / HVAC substation (temporary works area)	HVAC booster station (permanent land-take)	HVAC booster station (temporary works area)	Crossing Point (where HDD is proposed)	Crossing Point (where HDD with haul road over is proposed)	Crossing Point (where HDD with haul road over or open cut is proposed)	Crossing point (where HDD and ducting laydown is proposed)	Landfall Construction Compound	Main Construction Compound	Secondary Construction Compound	Storage Areas	Access routes	Total
Broad-leaved plantation woodland	0.00	0.00	0.00	0.00	0.00	0.10	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25
Broad-leaved semi-natural woodland	0.11	0.00	0.00	0.01	0.00	0.92	0.17	0.00	0.15	0.00	0.00	0.00	0.00	0.01	1.37
Coniferous plantation woodland	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33
Coniferous semi-natural woodland	0.00	0.00	0.00	0.00	0.00	0.39	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.43
Mixed plantation woodland	0.02	0.00	0.00	0.00	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.51
Mixed semi-natural woodland	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15
Dense scrub	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Scattered scrub	0.12	0.00	0.00	0.00	0.00	0.06	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19
Amenity grassland	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Improved grassland	5.80	0.00	0.00	0.00	0.00	0.99	0.20	0.12	0.02	0.20	0.00	0.00	0.27	0.14	7.74
Marsh/marshy grassland	0.00	0.00	0.00	0.00	0.00	1.12	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.04	1.3
Poor semi improved grassland	1.91	0.00	0.00	0.00	0.00	1.07	0.27	0.00	0.00	0.36	0.00	0.00	0.20	0.11	3.92
Semi-improved neutral grassland	0.09	0.00	0.00	0.00	0.00	0.12	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
Arable	62.37	3.24	1.32	1.22	0.47	0.70	0.90	0.92	0.00	0.00	0.00	0.37	3.31	0.75	75.57
Bracken continuous	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
Ephemeral/short perennial	0.76	0.00	0.00	0.00	0.00	0.02	0.04	0.00	0.00	0.13	0.00	0.00	0.13	0.03	1.11
Tall ruderal	0.15	0.00	0.00	0.00	0.00	0.03	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.22
Shingle above high tide mark	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.35
Bare ground	0.65	0.00	0.00	0.00	0.00	0.24	0.07	0.03	0.00	0.09	0.00	0.00	0.00	0.16	1.24
Buildings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
Hard surface	0.38	0.00	0.00	0.00	0.00	0.30	0.25	0.01	0.00	0.00	0.60	0.00	0.01	0.24	1.79
Unclassified	1.01	0.03	0.00	0.11	0.00	0.77	0.32	0.04	0.00	0.00	0.00	0.00	0.04	0.87	3.19
Total	73.41	3.27	1.32	1.34	0.47	7.65	2.79	1.5	0.17	0.78	0.6	0.37	3.96	2.37	100

Table 3.10: Approximate linear habitat areas identified within the footprint of onshore elements of Hornsea Three during the Phase 1 habitat survey.

Linear habitat type	Approximate length (m)														
	Onshore cable corridor (excluding areas crossed by HDD)	Onshore HVDC converter / HVAC substation (permanent land-take)	Onshore HVDC converter / HVAC substation (temporary works area)	HVAC booster station (permanent land-take)	HVAC booster station (temporary works area)	Crossing Point (where HDD is proposed)	Crossing Point (where HDD with haul road over is proposed)	Crossing Point (where HDD with haul road over or open cut is proposed)	Crossing point (where HDD and ducting laydown is proposed)	Landfall Construction Compound	Main Construction Compound	Secondary Construction Compound	Storage Areas	Access routes	Total
Hedge and trees (species poor)	1,015					495	92	80					246	42	1,970
Hedge and trees (species rich)	297						3						14		314
Intact hedge (species poor)	2,848	1,458	926	1,422		1,478	2,427	526				85	1,027	856	13,053
Intact hedge (species rich)	1,239	243				542	483	110					37	92	2,747
Defunct hedge (species poor)	262			362		269	99						109	10	1,111
Hedge (unclassified)	931					747	316	85					164	131	2,375
Running water	0					159	104	216					4		483
Dry ditch	940					86	333							258	1,617
Fence	934					104	18						130	10	1,196
Total	8,467	1,701	926	1,784	0	3,880	3,875	1,017	0	0	0	85	1,731	1,400	24,865

3.7.2.7 The following habitats, present in the survey area, are highlighted as Priority Habitats under the UK BAP and/or Norfolk LBAP, and are listed under Section 41 of the NERC Act (see Table 3.11).

Table 3.11: Priority Habitats under the UK BAP and Norfolk LBAP.

Priority habitats in Norfolk LBAP	Priority habitats in 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

Hedgerows

3.7.2.8 A hedgerow survey and condition assessment was undertaken in 2017 (volume 6, annex 3.2: Hedgerow Survey). Of the 127 hedgerows initially identified, access was not available for 19 hedgerows and one surveyed hedgerow did not meet the definition of hedgerows due to the presence of large gaps between trees.

3.7.2.9 Forty seven of the 107 hedgerows surveyed were found to be species-rich under the Hedgerow Survey Handbook Methodology (Defra, 2007b). However, only two of these are considered to be in favourable condition.

Species

Plants

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

3.7.2.11 Japanese knotweed was identified immediately adjacent to Morton Lane around a building extending 10 m into an arable field. This is approximately 160 m from the Hornsea Three onshore cable corridor at its closest point.

Invertebrates

3.7.2.12 Over 3,000 records of 114 insect species were obtained within the 2 km ecology and nature conservation data search area. The invertebrate records are largely clustered around Bodham Wood and Kelling Heath. Several records occur in the River Wensum SAC/SSSI and Alderford Common SSSI.

3.7.2.13 The records included 7 Diptera (flies), 1 Hemiptera (true bug), 26 Hymenoptera (bees and wasps), 4 butterflies, 75 moths and one beetle species: the black-headed cardinal beetle.

3.7.2.14 Records of white clawed crayfish were obtained from the River Glaven and River Wensum, and they are also known to be present in the River Tud.

3.7.2.15 Thirty-one sites along the Hornsea Three onshore cable corridor were identified as having potential for white clawed crayfish. Of these, access was not available for 17 sites. Therefore, surveys were undertaken at 14 sites, with white clawed crayfish only recorded at one location, in the River Wensum. Non-native signal crayfish were recorded at the River Bure and Reephams Beck (further details of the survey findings are provided in volume 6, annex 3.4: White Clawed Crayfish Survey).

3.7.2.16 Notwithstanding these survey results, based on the desk study and consultee responses received, this assessment has assumed that white clawed crayfish are present in the River Glaven and River Tud.

3.7.2.17 As such, the populations of white clawed crayfish in the survey area are considered to be of County importance.

3.7.2.18 Desmoulin's whorl snail and narrow-mouthed whorl snail are known to be present within Booton Common. Desmoulin's whorl snail is also known to be present within the Wensum River Valley SAC/SSSI, although no records of these species were obtained from the 2 km ecology and nature conservation data search area.

3.7.2.19 Surveys for Desmoulin's whorl snail and narrow-mouthed whorl snail were undertaken in 2017 (volume 6, annex 3.3: Desmoulin's Whorl Snail Survey). Forty sites were assessed for habitat suitability, of which only four were assessed as being of good habitat. Based on the habitat suitability results, surveys were carried out at ten sites, and no evidence of either species was found. Due to access constraints, surveys could not be undertaken in suitable habitat adjacent to the Rivers Wensum and Tud. However, no records of this species were returned from the data search and for the purposes of this assessment it is assumed that this species is absent from the Hornsea Three ecology and nature conservation study area.

Amphibians

3.7.2.20 The data search returned 181 records of GCN and 108 records of common toad within the 2 km ecology and nature conservation data search area. GCNs have been recorded south of Little Melton and near Cawston. Records of GCNs and other amphibians were also found at Alderford Common SSSI.

- 3.7.2.21 Three hundred and forty waterbodies were initially identified as requiring investigation for GCN. Access was not available for 82 of these, so 258 waterbodies were visited for an initial Habitat Suitability Index (HSI) assessment, which found that 50 of these waterbodies were unsuitable. 179 waterbodies were considered for eDNA analysis, and, of these, 39 were inaccessible and 25 were found to be unsuitable at the time of eDNA sampling. Therefore, 115 ponds were sampled using eDNA techniques, and GCN were found to be present in 28 of these waterbodies. Population size class analysis was carried out on 22 of these 28 waterbodies, and no populations defined as 'large' were found.
- 3.7.2.22 GCN were recorded at Beach Lane in Weybourne, and are therefore also assumed to be present on unsurveyed waterbodies in Weybourne Camp. A cluster of waterbodies containing GCN was found between 20 m and 75 m of the onshore cable corridor south of Bodham. Other clusters of GCN populations occurred in the vicinity of Alderford Common, the closest of which was less than 50 m from the onshore cable corridor; the River Wensum, over 60 m from the onshore cable corridor; and south of Little Melton, within 15 m of the onshore cable corridor. A single waterbody containing GCN was found approximately 150 m south of the onshore cable corridor, north of Swardeston (see Figure 3.2).
- 3.7.2.23 Survey results therefore identified the existence of five clusters of waterbodies containing GCN that could be affected by Hornsea Three. However, it should be noted that access to all parts of the onshore cable corridor could not be obtained. Where access was not possible, pre-construction surveys will be undertaken. Further details of the survey findings are provided in volume 6, annex 3.5: Great Crested Newt Survey.
- 3.7.2.24 The GCN populations present in the survey area are considered to be of District importance.
- Reptiles
- 3.7.2.25 Records of common lizard, grass snake, adder and slow worm were found within the 2 km ecology and nature conservation data search area. The data search returned 14 records of common lizard and slow worm, ten records of grass snake, and four records of adder from the search area.
- 3.7.2.26 Reptile surveys were carried out in 56 areas of suitable habitat within the Hornsea Three ecology and nature conservation study area and reptile presence was recorded at 23 of these sites. No reptile observations were made from within areas of permanent land-take.
- 3.7.2.27 Adders were only recorded in one location (Kelling Heath, where grass snake, slow worm and common lizard were also recorded), although a consultation response included records of adders at Weybourne Camp, which was not accessible for survey. Further details of the consultation responses are found in the Consultation Report that accompanies the DCO application. Slow worms were recorded in three clusters, over 150 m from the onshore cable corridor at Kelling Heath SSSI; within the onshore cable corridor north of High Kelling; approximately 10 m from the onshore cable corridor at Alderford Common SSSI; within 15 m of the onshore cable corridor north of Booton Common SSSI; and at a number of locations within the onshore cable corridor both north and south of the River Wensum. Common lizards were recorded over 150 m from the onshore cable corridor at Kelling Heath SSSI; within the onshore cable corridor west of Saxthorpe; approximately 30 m from the onshore cable corridor at Alderford Common; over 150 m of the onshore cable corridor southwest of Heathersett; and within 15 m of the onshore cable corridor north of Swardeston. Grass snakes were recorded at Alderford Common, and at a number of survey areas between the Yare Valley and east of Heathersett. Grass snakes were recorded within the onshore cable corridor at the River Yare and west of Foxburrow Meadow CWS, and within 15 m of the corridor south of Little Melton and east of Heathersett. Further details of the survey findings are provided in volume 6, annex 3.6: Reptile Survey, and locations of records are shown on Figure 3.2.
- 3.7.2.28 Reptile populations present in the survey area are considered to be of District importance.
- Birds
- 3.7.2.29 Twenty-three Schedule 1 bird species have been recorded within the 5 km ornithology data search area. These include records of black redstart, stone curlew and barn owl.
- 3.7.2.30 Other Schedule 1 species recorded within the 5 km ornithology data search area include peregrine, brambling, redwing, Cetti's warbler, greylag goose, kingfisher, hobby, whooper swan and goshawk.
- 3.7.2.31 The bird records are largely clustered around Brandiston and Marlingford. This is likely to reflect the density of bird recorders in these areas.
- Wintering and migratory birds*
- 3.7.2.32 Wintering bird surveys were carried out in the winter of 2016-2017. Further surveys of the final Hornsea Three onshore cable corridor between Weybourne and Bodham were carried out in the winter of 2017-2018 to include the section of route between Weybourne Camp east of Kelling Heath that was not covered in the 2016-2017 surveys.
- 3.7.2.33 Winter bird surveys in 2016-2017 recorded 83 species within the wintering point count surveys within the survey area. 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. Therefore, only pink-footed geese are discussed in more detail in the following paragraphs.

- 3.7.2.34 Pink-footed geese were found to use fields within and adjacent to the Hornsea Three onshore 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. A distribution map is provided in Figure 3 of volume 6, annex 3.9: Onshore Ornithology – Wintering and Migratory Bird Survey.
- 3.7.2.35 The vast majority of geese were recorded in the coastal area of Weybourne where almost all fields that held sugar beet crop were utilised at some point in the period. The maximum count of pink-footed geese recorded during the 2016-2017 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. However, these geese were recorded east of Weybourne > 1 km from landfall and substantially further from the onshore cable corridor as it runs west and south.
- 3.7.2.36 Targeted surveys for pink-footed geese and other wintering bird species associated with the North Norfolk Coast SPA carried out in October 2017 – February 2018 recorded a maximum pink-footed goose flock of 4,710 (20% of the SPA population). The pink footed geese were recorded using fields approximately 300-400 m west of the onshore cable corridor at Kelling / Salthouse in November and then moved over to the Weybourne area approximately 2 km east of the onshore cable corridor in December.
- 3.7.2.37 The largest recorded numbers of pink-footed geese within the Hornsea Three onshore cable corridor in 2016-2017 was at a field at High Kelling, south of Kelling Heath, which was utilised by 9,000 geese in early January 2017. This represents 37% of the five-year peak mean count of this species (23,802) from the North Norfolk Coast SPA citation, although geese were not recorded using this field in other months of the 2016-2017 survey. This field was not planted with sugar beet at the time of the surveys in 2017/2018, and no pink-footed geese were recorded using it in October – December 2017. A maximum count of 2,500 geese was recorded in this field in January 2018, with lower counts (maximum of 1,200) recorded in the field further south. No pink-footed geese were recorded anywhere within the survey area in February 2018.
- 3.7.2.38 Pink-footed geese were rarely recorded any further south than Hempstead, despite sugar beet being available.
- 3.7.2.39 No pink-footed geese were recorded on any fields traversed by the onshore cable corridor in surveys from October – December 2017. Pink-footed geese were recorded using a field at Warren House Farm on one occasion in January 2018, despite this field not being planted with sugar beet.
- 3.7.2.40 Presence of sugar beet and proximity to the coast are clearly the factors which influence the distribution of this species.
- 3.7.2.41 The wintering pink-footed goose population is considered to be of International importance. The general wintering bird assemblage present within Hornsea Three ecology and nature conservation study area is considered to be of District importance.

- 3.7.2.42 Further details of the survey findings are provided in volume 6, annex 3.9: Onshore Ornithology – Wintering and Migratory Bird Survey.

Breeding birds

- 3.7.2.43 Surveys for breeding birds were carried out in 2017 and involved territory mapping at the landfall area and in the locations where permanent land take would occur (i.e. the onshore HVAC booster station and the onshore HVDC converter/HVAC substation) and the main construction compound.
- 3.7.2.44 Surveys recorded 61 species considered possibly or likely to be breeding. No Schedule 1 species were considered likely to be breeding within the corridor. Birds of Conservation Concern (BoCC) Red List or Section 41 listed species recorded along the corridor comprised:
- Grey partridge;
 - Cuckoo;
 - Marsh tit;
 - Skylark (widespread and common throughout);
 - Song thrush (widespread – singing males at 31 point counts);
 - Dunnock (widespread and common throughout);
 - House sparrow (point count 53);
 - Bullfinch (widespread);
 - Linnet (widespread with singing males recorded at eleven point counts);
 - Yellowhammer (common in heath and arable areas – likely breeding at 30 point counts); and
 - Reed bunting (one point count only).
- 3.7.2.45 Of these species, skylark, song thrush, dunnock, bullfinch, linnet and yellowhammer were commonly recorded. The other species were recorded in a few locations only.
- 3.7.2.46 Species recorded in areas of permanent or temporary land take (including substations and construction compounds) are summarised in Table 3.12.

Table 3.12: Total number of species recorded at each survey site (total number of breeding species given in brackets)

Site	Species Total	Birds Directive Annex 1	WCA Schedule 1	NERC Act Section 41	Norfolk Action Plans ²	BoCC Red List	BoCC Amber List
HVAC Booster Station area	57 (30)	1 (0)	1 (0)	13 (7)	5 (2)	12 (6)	13 (4)
HVDC Compound/HVAC Substation area	48 (21)	0 (0)	0 (0)	9 (4)	3 (2)	8 (4)	8 (1)

² <http://www.norfolkbiobiodiversity.org/actionplans/speciesactionplans/#Birds>

Site	Species Total	Birds Directive Annex 1	WCA Schedule 1	NERC Act Section 41	Norfolk Action Plans ²	BoCC Red List	BoCC Amber List
Main Construction Compound	39 (15)	1 (0)	1 (0)	7 (3)	1 (1)	6 (2)	8 (3)
Landfall area	79 (34)	3 (0)	5 (2)	17 (6)	6 (2)	17 (5)	22 (5)

3.7.2.47 Seven Section 41 species were recorded breeding at the HVAC booster station (marsh tit, skylark, song thrush, dunnock, house sparrow, linnet and yellowhammer) of which two species (skylark and song thrush) are also subject to Norfolk species action plans.

3.7.2.48 Four Section 41 species were recorded breeding at the onshore HVDC converter/HVAC substation (skylark, song thrush, dunnock and yellowhammer); three Section 41 species were recorded breeding at the main construction compound (skylark, dunnock and linnet), and six Section 41 species were recorded breeding at the landfall area (cuckoo, skylark, dunnock, linnet, yellowhammer and reed bunting).

3.7.2.49 Two species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) were recorded breeding at the landfall site. Little ringed plover breeding behaviour was observed through a distraction-display of a single adult within the grounds of the Muckleburgh Collection (Weybourne Camp). This species is a nationally scarce breeding species (575 pairs) (Holling and the Rare Breeding Birds Panel, 2016) with a small county population (25 – 40 breeding pairs; Taylor and Marchant, 2011).

3.7.2.50 Three singing male Cetti's warbler were recorded in wetland habitat west of the Weybourne Beach car park (with this area forming a CWS (Beach Lane), see Table 3.7). This species is a nationally 'less scarce' breeding species (defined as species with over 1,000 breeding pairs in the UK) with the national population estimated to be 1,622 breeding pairs (Holling and the Rare Breeding Birds Panel, 2016). The county population was estimated by Taylor and Marchant (2011) to be 100–400 singing males.

3.7.2.51 Skylark was the most abundant species of conservation concern recorded during the surveys; the number of territories recorded was 15 (HVAC booster station), six (onshore HVDC converter/HVAC substation), 23 (landfall construction compound) and four (main construction compound).

3.7.2.52 Further details of the survey findings are provided in volume 6, annex 3.10: Onshore Ornithology – Breeding Bird Survey.

3.7.2.53 The breeding bird assemblage is considered to be of District importance.

Bats

3.7.2.54 Twelve bat species have been recorded within the 5 km bat data search area and within the Hornsea Three onshore cable corridor.

3.7.2.55 Over 8,000 bat records were obtained within the 5 km bat data search area. Bat data records were clustered within three areas at the north end of the onshore cable corridor, at Weybourne, High Kelling and around Hundred Acre Wood. Species present in this area comprise soprano pipistrelle, barbastelle, brown long-eared and nathusius' and common pipistrelle bats.

3.7.2.56 Other areas with clusters of bat records include around Old Decoy, Selbrigg Pond, The Lows CWS, Pond Hills CWS, Little Wood, land around Alderford and Furze Meadow. Species present in these areas include natterer's, noctule and whiskered bats.

3.7.2.57 Clusters of bat records also occur on land around Norwich, Alderford, Weston Longville, Marlingborough and east of Heathersett.

3.7.2.58 Clusters of records may well be caused by a higher density of bat recorders in these areas, rather than a higher level of bat populations.

3.7.2.59 Other bat species records found within the desk study search area include Daubenton's bat, Brandt's bat and serotine bats.

3.7.2.60 Bat surveys were also carried out along the length of the onshore cable corridor. Surveys to determine areas of importance for foraging or commuting bats were undertaken using static monitoring detectors and transect surveys.

3.7.2.61 Static monitoring and transect surveys recorded eight bat species and four species groups. These were:

- Common pipistrelle;
- Nathusius' pipistrelle;
- Soprano pipistrelle;
- Unidentified bats belonging to the pipistrelle genus;
- Unidentified bats belonging to the Myotis genus;
- Brown long-eared bat;
- Barbastelle;
- Serotine;
- Leisler's bat;
- Noctule;
- Unidentified bats belonging to the noctule / serotine / Leisler's bat guild; and
- Unidentified bats belonging to the Nyctalus genus.

3.7.2.62 The assemblage of bats recorded in the ecology and nature conservation study area is considered to be of County importance.

3.7.2.63 Surveys of 665 trees were carried out to determine potential for roosting bats. Of these, 222 were considered to be of Moderate or High potential. Access for emergence survey was possible for 106 trees, and four trees supporting bat roosts were identified (see Figure 3.2), of which one tree is within the onshore cable corridor and would be affected by cabling works. Species found to be present were soprano pipistrelle (two roosts), common pipistrelle and noctule.

3.7.2.64 Roosting bats are considered to be of District importance.

3.7.2.65 Further details of the survey findings are provided in volume 6, annex 3.8: Bat Surveys.

Badger

3.7.2.66 Badgers have been recorded within the Hornsea Three onshore cable corridor and within the 2 km ecology and nature conservation data search area. The data search returned over 75 badger records from the search area.

3.7.2.67 Badger surveys undertaken along the route recorded seven badger setts in the survey area, including six outlier setts (two well used, two partially used with current signs of activity, one partially used with no signs of current activity and one disused) and one subsidiary sett (partially used with no signs of current activity). None of the setts were main setts. Further details of the survey findings are provided in volume 6, annex 3.12: Badger Survey.

3.7.2.68 The badger population is considered to be of District importance.

Otter

3.7.2.69 The data search returned 39 otter records within the 2 km ecology and nature conservation data search area. Otters have been recorded off Sheringham Road near Weybourne, east of the Hornsea Three onshore cable corridor boundary near Saxthorpe and on the River Yare within the Hornsea Three onshore cable corridor.

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

3.7.2.71 Eighty-nine waterbodies (including rivers, streams, ditches and ponds) were identified as requiring survey for otters. Out of 75 sites surveyed, field signs indicating the presence of otter were recorded at 14 waterbodies distributed along the length of the onshore cable corridor. Otters were recorded along the rivers Yare and Wensum, as well as a waterbody south of Lower Bodham, at Salle, the stream associated with Low Common, Hethersett and Swardeston.

3.7.2.72 Fourteen waterbodies, including the River Tud, could not be visited due to access limitations. Further details of the survey findings and the areas surveyed are provided in volume 6, annex 3.11: Otter Survey.

3.7.2.73 The otter population is considered to be of County importance.

Water vole

3.7.2.74 The data search returned 28 water vole records within the 2 km ecology and nature conservation data search area. Water voles have been recorded near the River Bure and on the River Wensum, both upriver and downriver from where the Hornsea Three onshore cable corridor crosses the river. Other records are found east of the site boundary near Cawston and in Saxthorpe and the surrounding area.

3.7.2.75 Surveys for water voles were undertaken at 48 waterbodies (including rivers, streams, ditches and ponds) which were identified as requiring further survey. A further seven waterbodies had been identified as requiring further survey, but could not be surveyed due to land access restrictions.

3.7.2.76 Field signs indicating the presence of water vole were recorded at 16 waterbodies distributed along the length of the Hornsea Three onshore cable corridor.

3.7.2.77 Water voles were recorded at Weybourne east of the Landfall, at a pond near Lower Bodham, along the River Bure, at Salle, on Blackwater Drain, the Rivers Wensum and Bure, and Hethersett and north of Swardeston. The River Tud could not be accessed for survey.

3.7.2.78 Further details of the survey findings are provided in volume 6, annex 3.7: Water Vole Survey.

3.7.2.79 Water vole populations are considered to be of District importance.

3.7.3 Valued Ecological Receptors

3.7.3.1 Valued Ecological Receptors (VERs) are sites, habitats and species of ecological or nature conservation importance that could be significantly affected by a project. Sites, habitats or species identified during the desk study or survey work that are not considered likely to be affected are not considered further in this chapter.

3.7.3.2 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) have been 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.

3.7.3.3 The valuation of sites also takes full account of existing value systems such as SSSIs and Local Wildlife Sites (LWSs) designations.

3.7.3.4 In accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM, 2016) 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.
- 3.7.3.5 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 planning authorities and the Wildlife Trusts for the selection of local sites. Legal protection status is also a consideration for certain habitats, as outlined in section 3.4.
- 3.7.3.6 Populations of species 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.
- 3.7.3.7 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.
- 3.7.3.8 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 Hornsea Three. For European Protected Species (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.
- 3.7.3.9 Various criteria can be used to evaluate the importance of species assemblages, such as SSSI selection criteria.
- 3.7.3.10 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.
- 3.7.3.11 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.
- 3.7.3.12 Those VERs which are of at least District level importance are listed in Table 3.13.

Table 3.13: Summary of importance of onshore VERs identified.

VER	Covering legislation and guidance	Level of Importance
North Norfolk Coast SPA	Conservation Regulations 2017. 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	Conservation Regulations 2017. The site meets four criteria of Ramsar (criterion 1, 2, 5 and 6).	International
Norfolk Valley Fens SAC	Conservation Regulations 2017. 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	Conservation Regulations 2017. This site contains habitat types listed in Annex 1 of the Habitats Directive. Rivers are a Priority Habitat of the UK BAP.	International
Alderford Common SSSI	Wildlife & Countryside Act 1981 (and as amended). Supports UKBAP Priority habitats and species.	National
Booton Common SSSI	Wildlife & Countryside Act 1981 (and as amended). Supports UKBAP Priority habitats and species.	National
North Norfolk Coast SSSI	Wildlife & Countryside Act 1981 (and as amended). Supports UKBAP Priority habitats and species.	National
Kelling Heath SSSI	Wildlife & Countryside Act 1981 (and as amended). Supports UKBAP Priority habitats and species.	National
River Wensum SSSI	Wildlife & Countryside Act 1981 (and as amended). Supports UKBAP Priority habitats and species.	National
Muckleburgh Hill CWS	Considered in local authority policies under the domestic planning regime with applications made to local authorities.	County
Old Decoy, Selbrigg Pond, The Lows CWS	Considered in local authority policies under the domestic planning regime with applications made to local authorities.	County
New Covert CWS	Considered in local authority policies under the domestic planning regime with applications made to local authorities.	County
Dismantled Railway CWS	Considered in local authority policies under the domestic planning regime with applications made to local authorities.	County
Alderford Common CWS	Considered in local authority policies under the domestic planning regime with applications made to local authorities.	County
Marriott's Way CWS	Considered in local authority policies under the domestic planning regime with applications made to local authorities.	County
Yare Valley (Marlingford) CWS	Considered in local authority policies under the domestic planning regime with applications made to local authorities.	County
Old Hall Meadow CWS	Considered in local authority policies under the domestic planning regime with applications made to local authorities.	County
Bush Meadow Plantation CWS	Considered in local authority policies under the domestic planning regime with applications made to local authorities.	County
Harman's Grove CWS	Considered in local authority policies under the domestic planning regime with applications made to local authorities.	County
Land adjoining River Tud CWS	Considered in local authority policies under the domestic planning regime with applications made to local authorities.	County
Low Common CWS	Considered in local authority policies under the domestic planning regime with applications made to local authorities.	County
Foxburrow Meadow CWS	Considered in local authority policies under the domestic planning regime with applications made to local authorities.	County
Algarsthorpe Marshes CWS	Considered in local authority policies under the domestic planning regime with applications made to local authorities.	County
River Yare at Marlingford CWS	Considered in local authority policies under the domestic planning regime with applications made to local authorities.	County
Hedgerows	The Hedgerow Regulations 1997 protect "important" hedgerows 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

VER	Covering legislation and guidance	Level of Importance
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.	County
Arable field margins	Arable field margins is a Priority Habitat of the UK BAP.	District
Woodland and mature broadleaved trees	Woodlands are Priority Habitats under the UK BAP.	District
GCN	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 Natural England 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.	District
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).	District
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).	District
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.	District
Otters	Otters 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 Natural England to comply with the Habitats Regulations. 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.	County
Badgers	Badgers are protected under the Protection of Badgers Act 1992.	District
Bats	All bat species 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 Natural England to comply with the Habitats Regulations 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.	County (foraging) District (roosting)



Figure 3.2: Ecological constraints

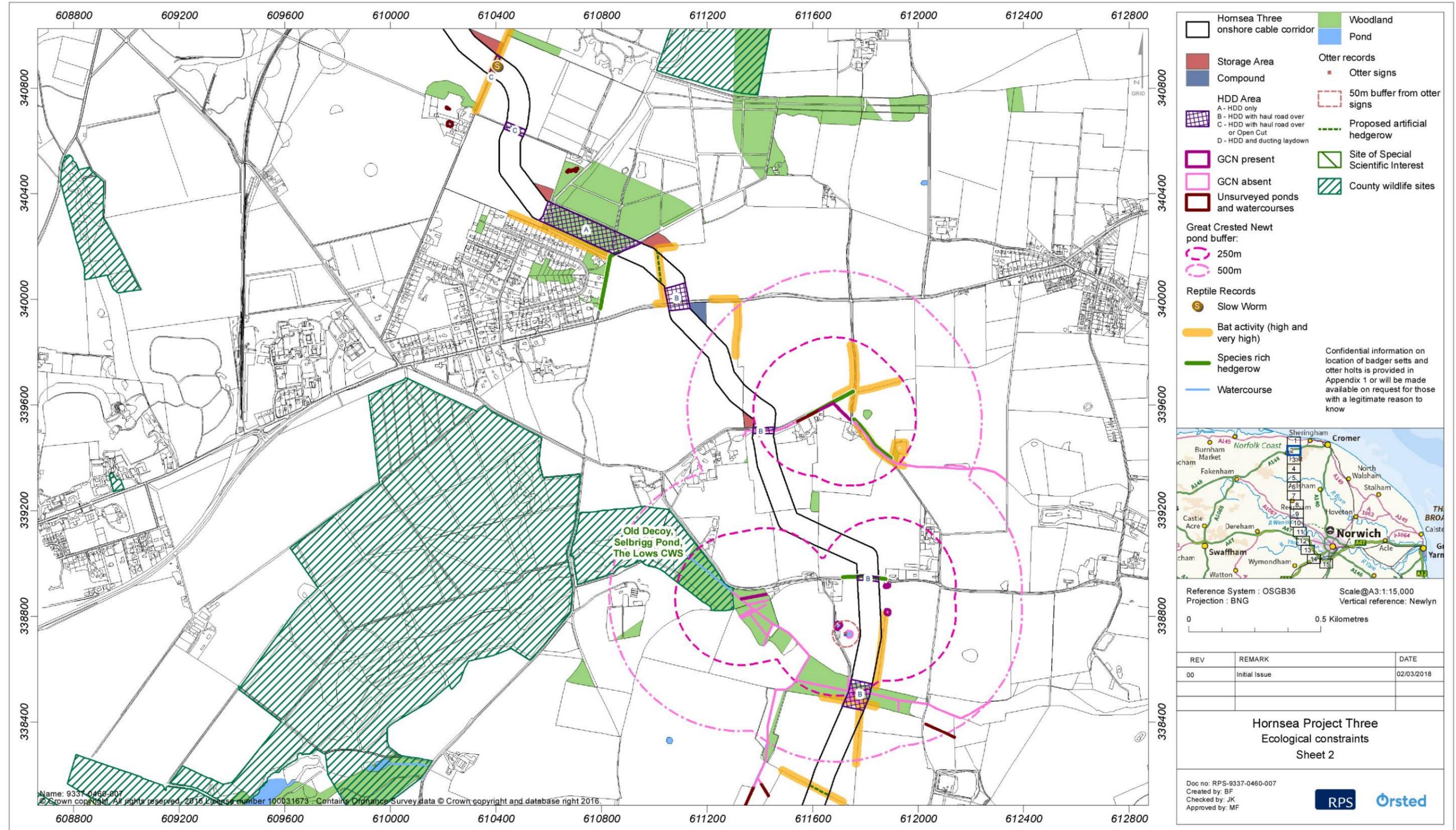


Figure 3.2: Ecological constraints

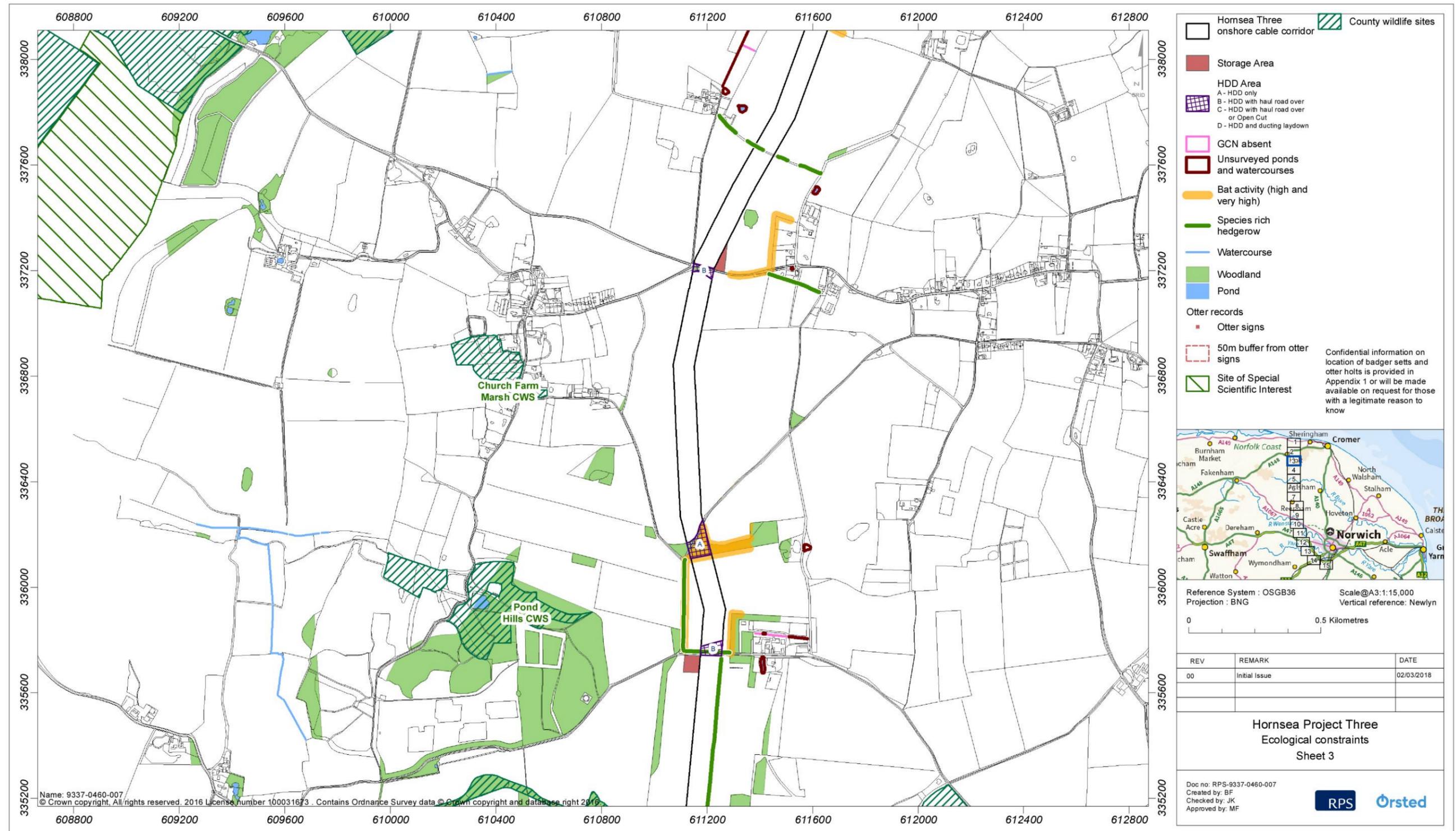


Figure 3.2: Ecological constraints

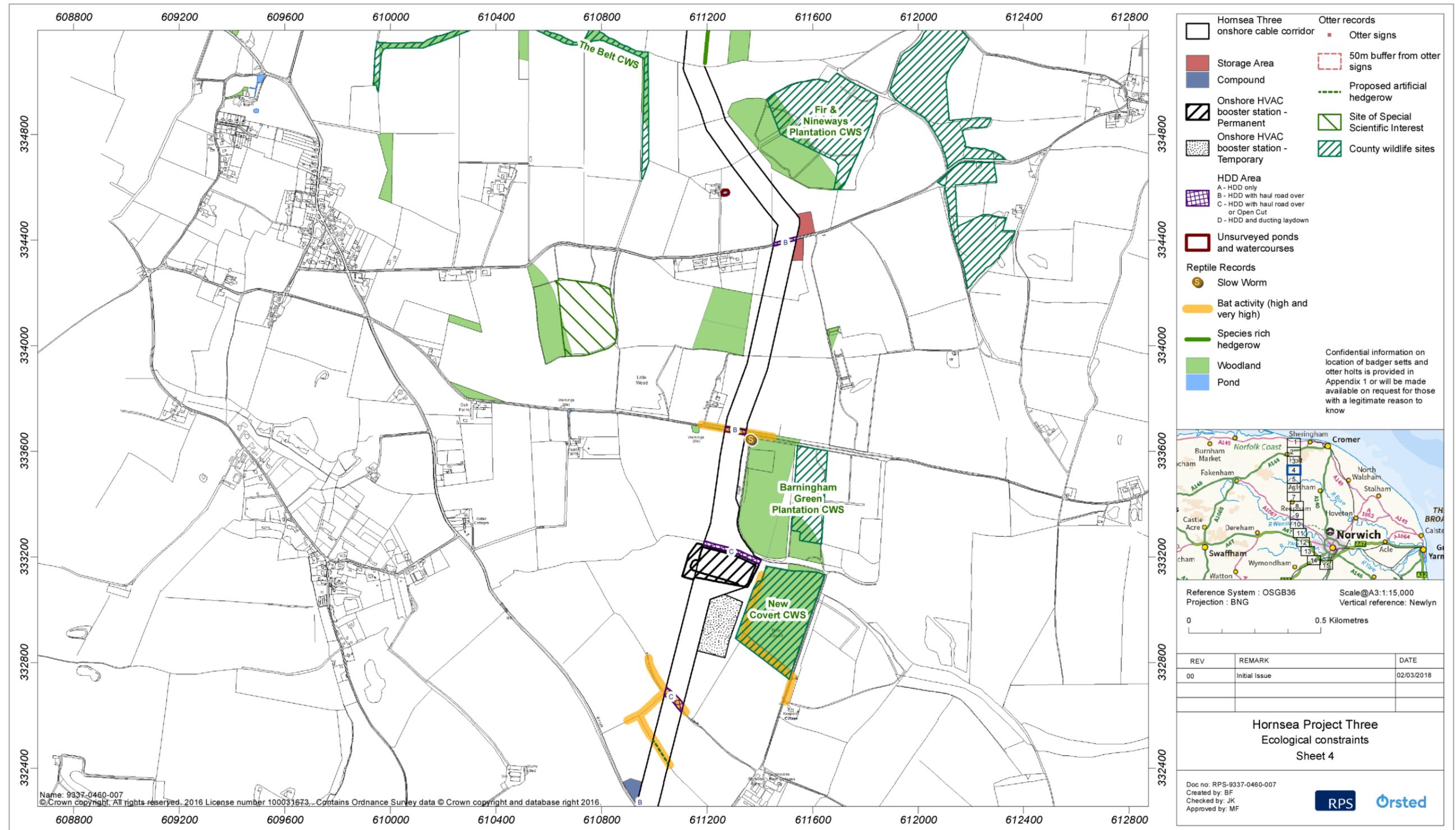


Figure 3.2: Ecological constraints

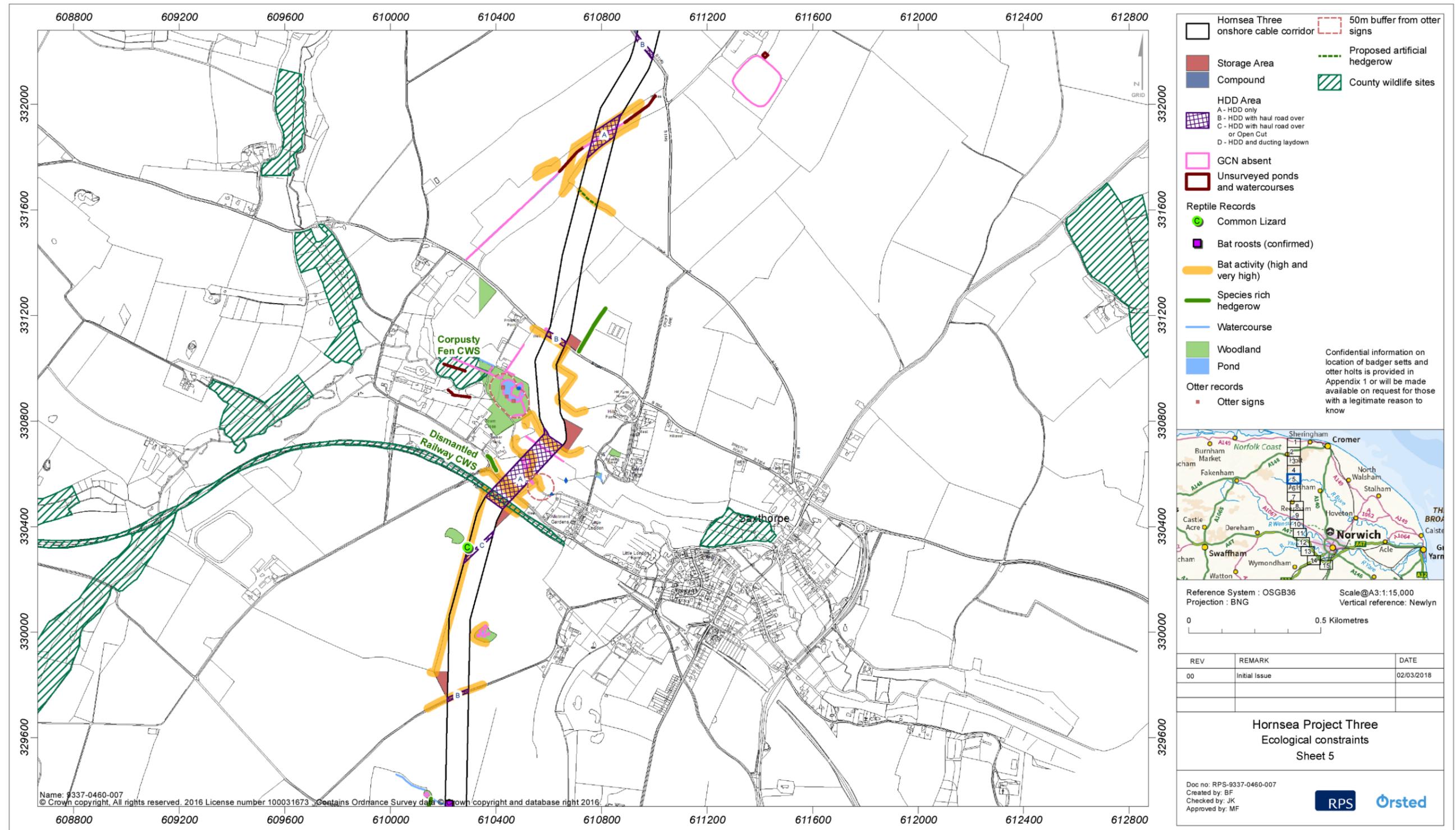


Figure 3.2: Ecological constraints

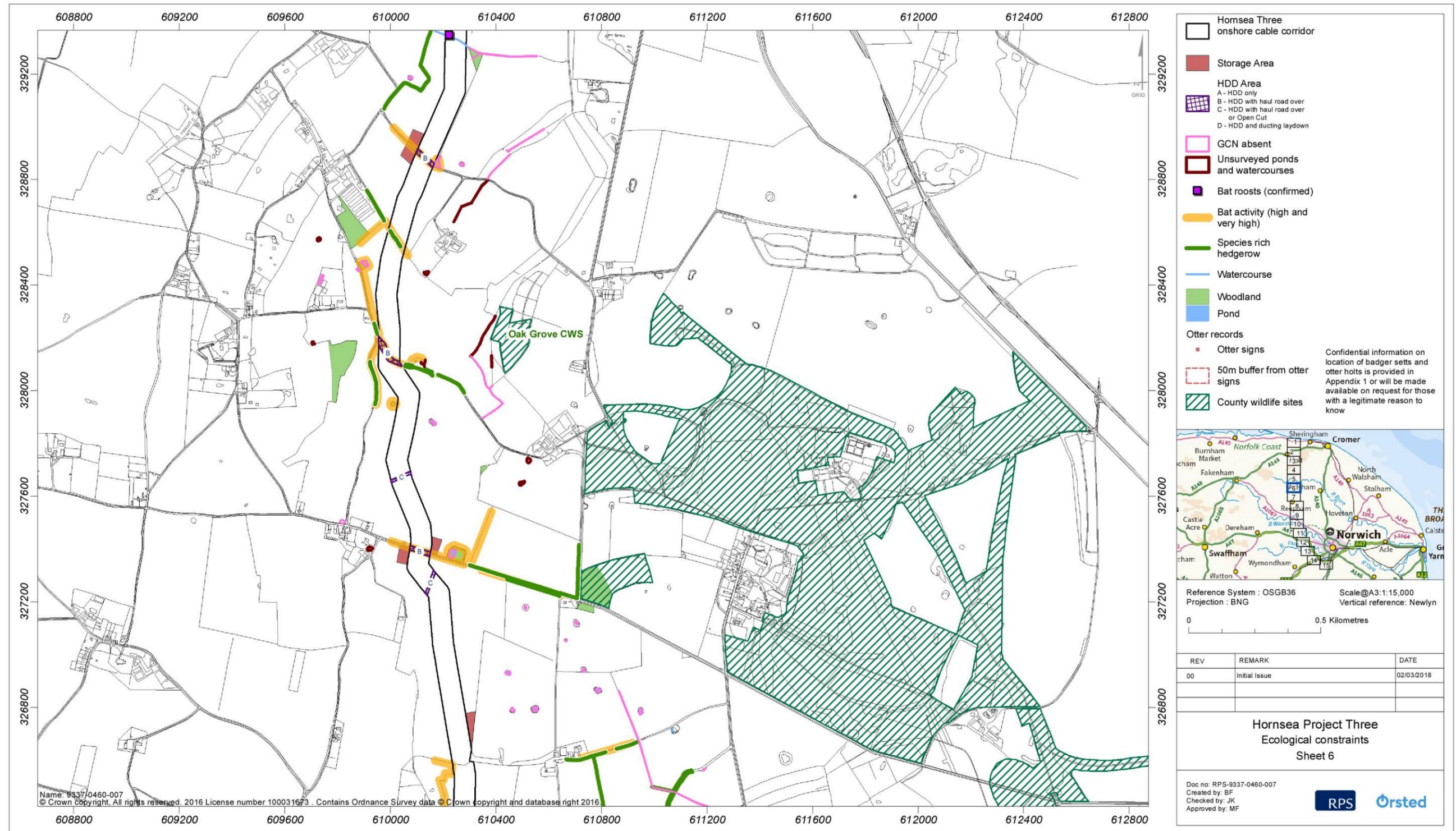


Figure 3.2: Ecological constraints

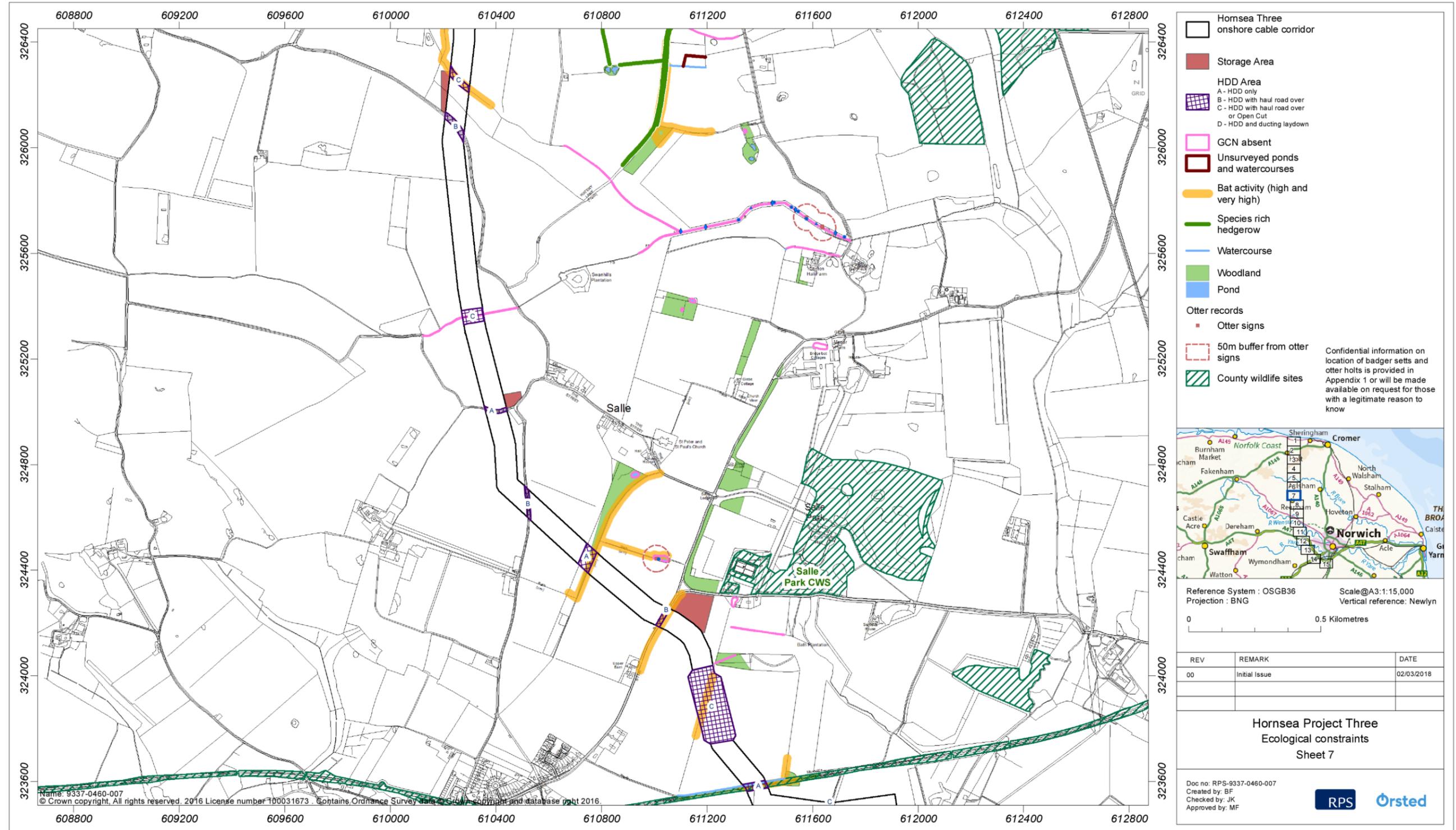


Figure 3.2: Ecological constraints

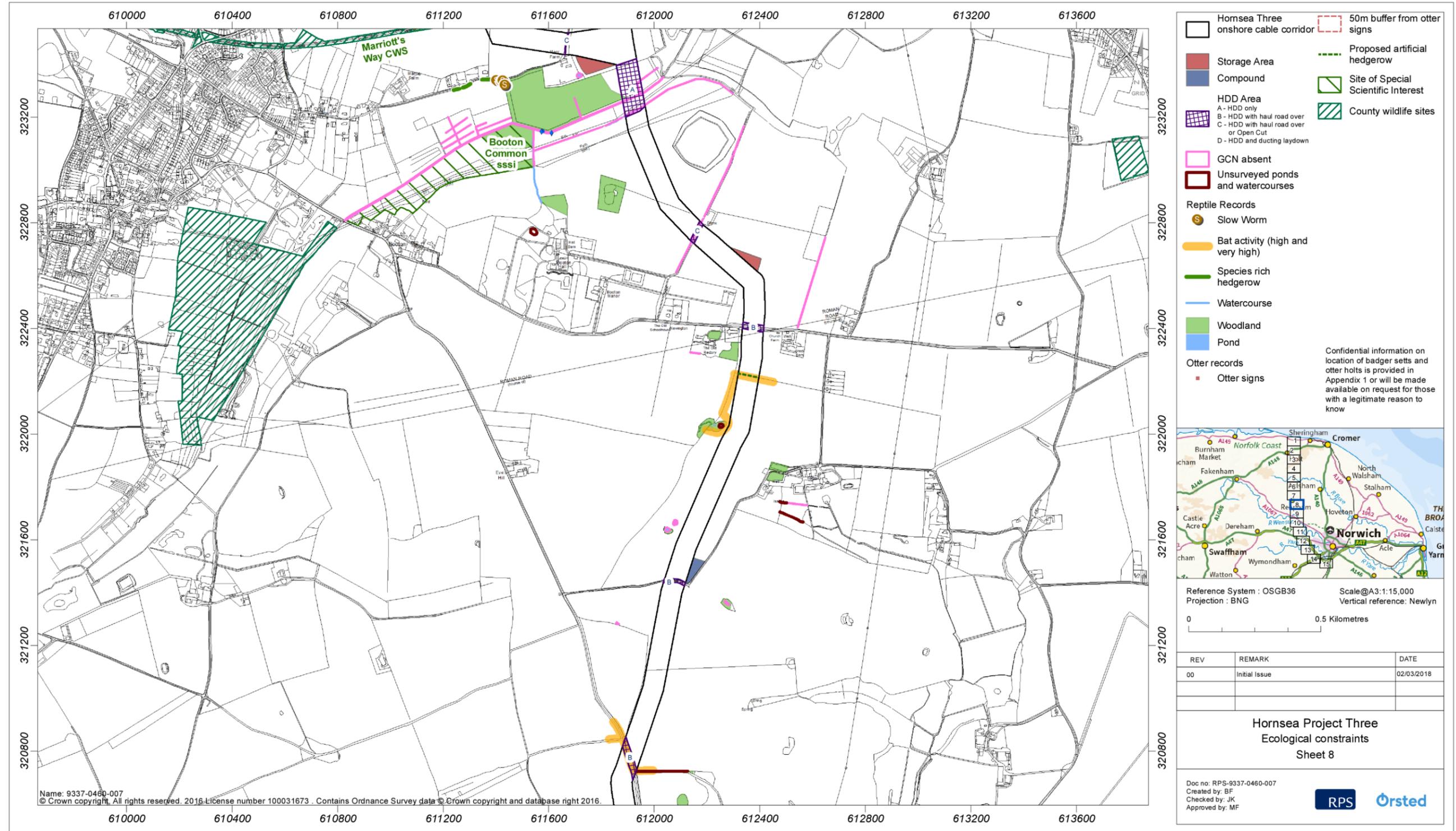


Figure 3.2: Ecological constraints

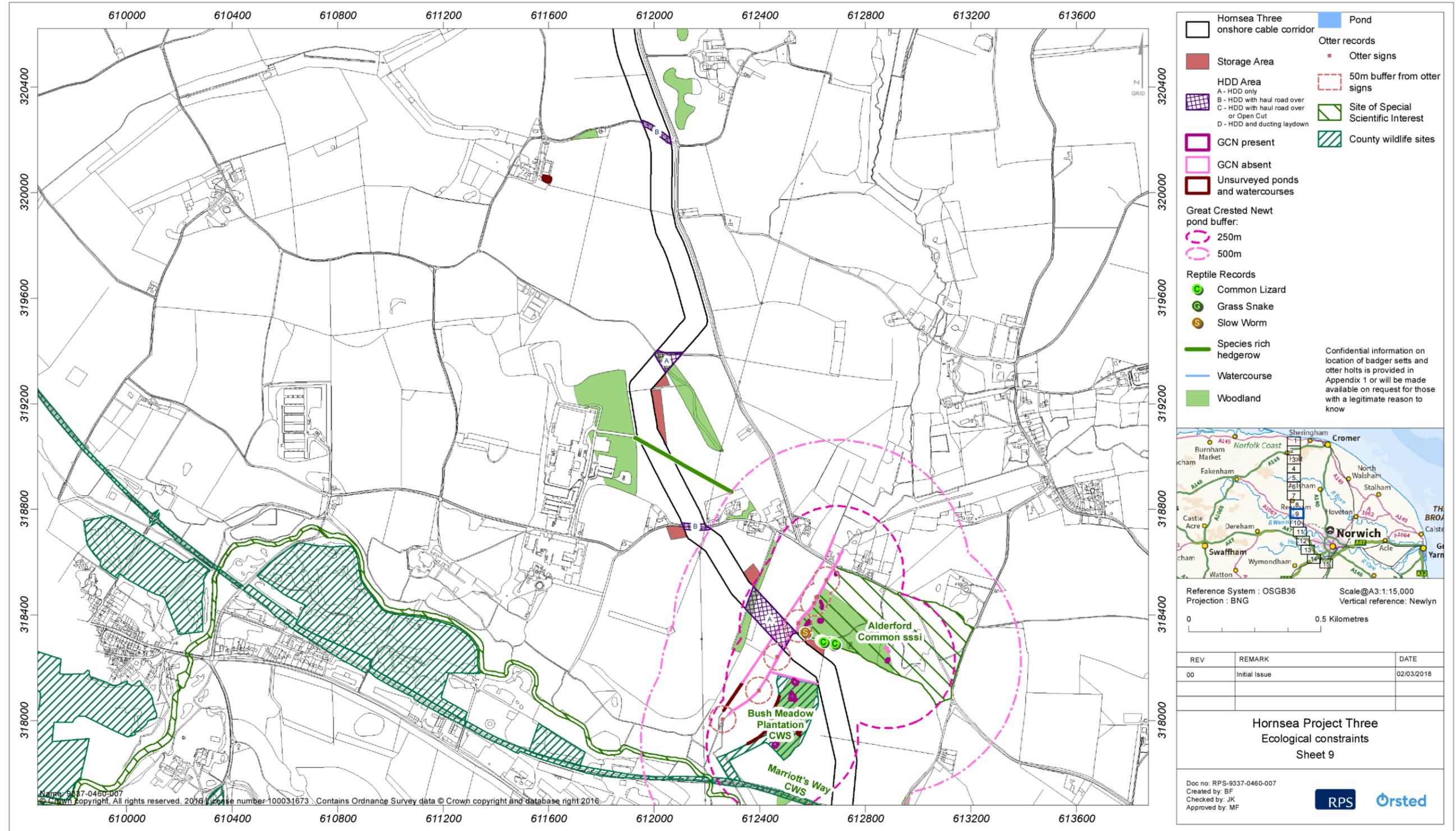


Figure 3.2: Ecological constraints

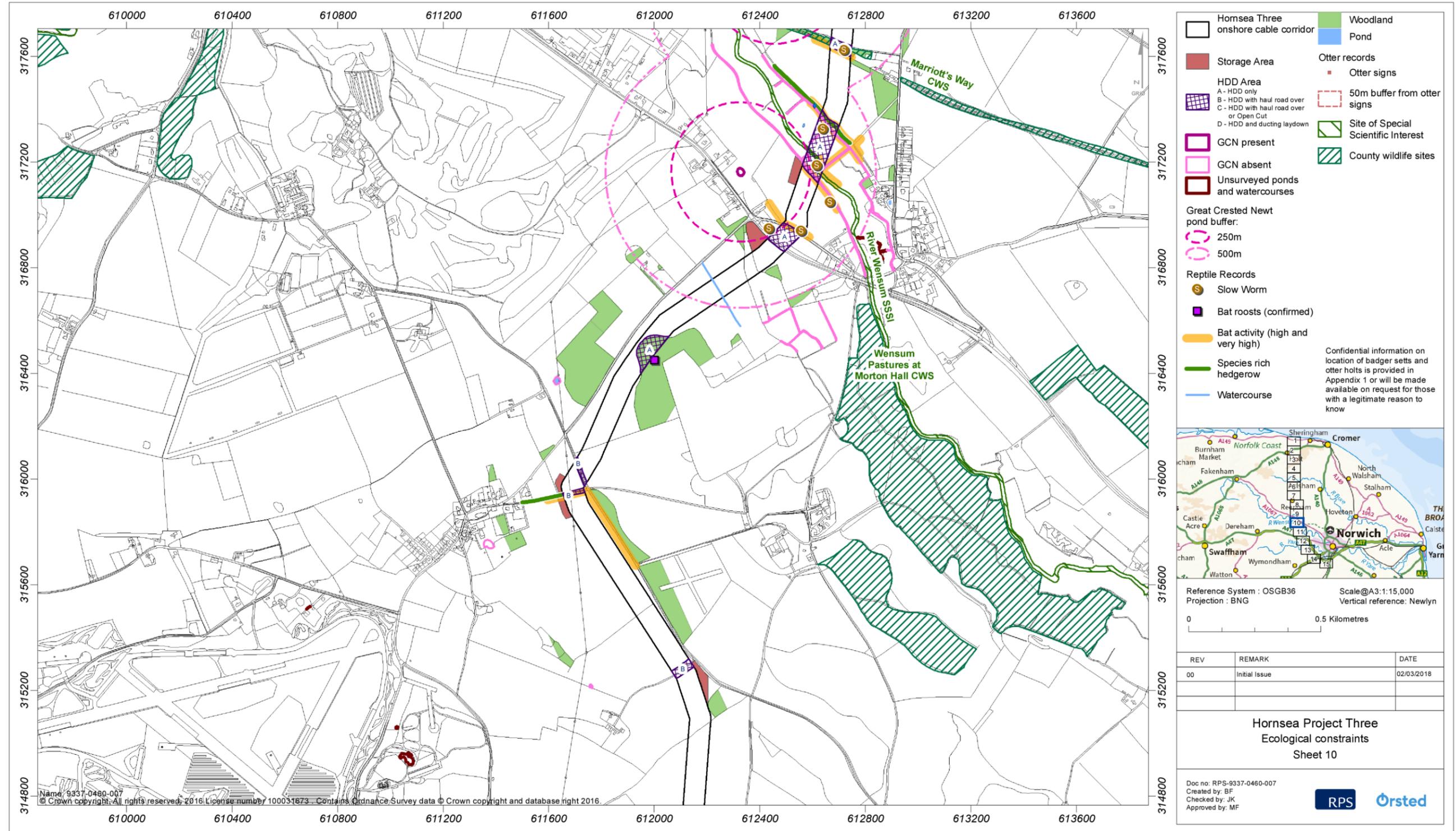


Figure 3.2: Ecological constraints

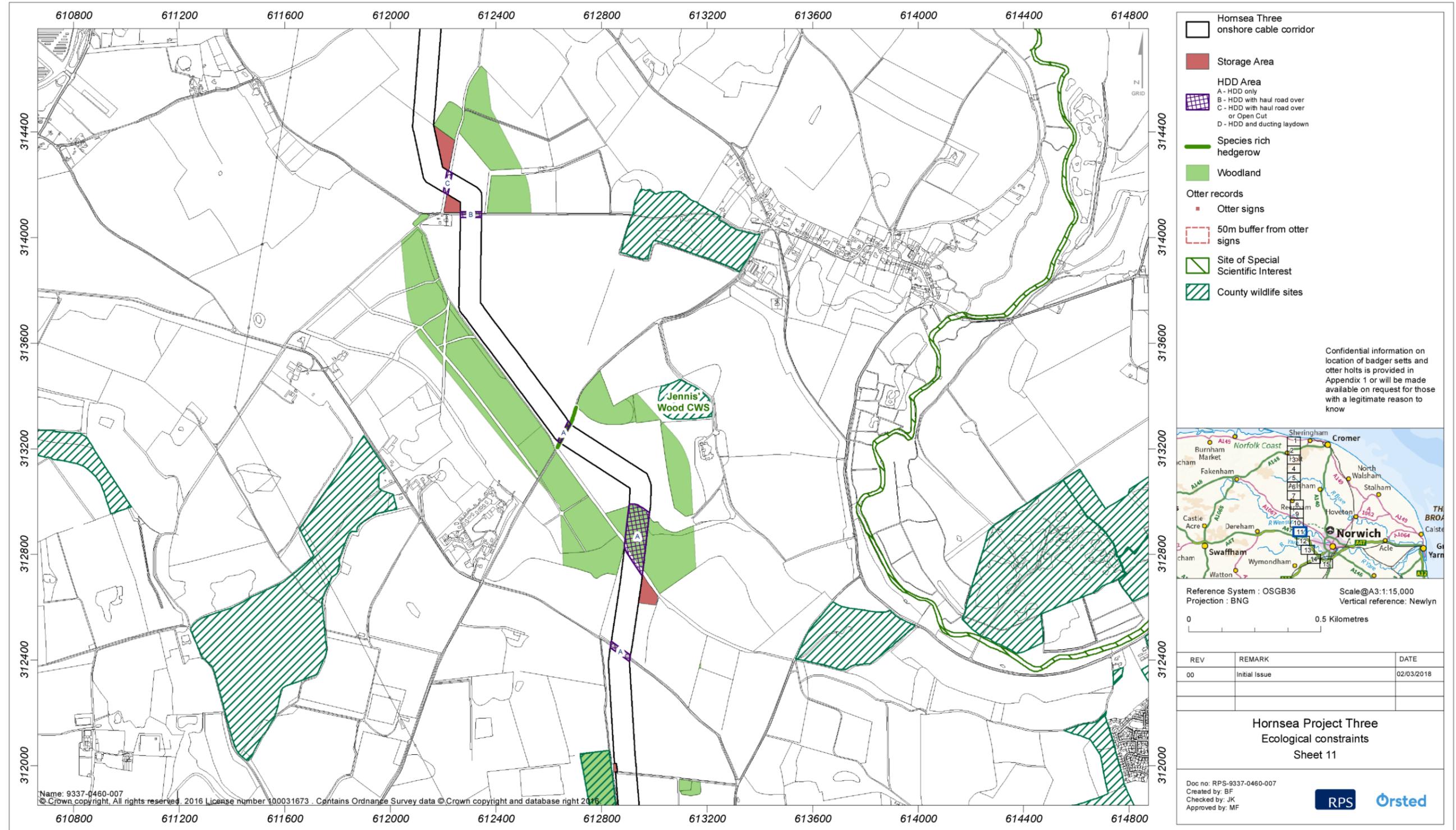


Figure 3.2: Ecological constraints

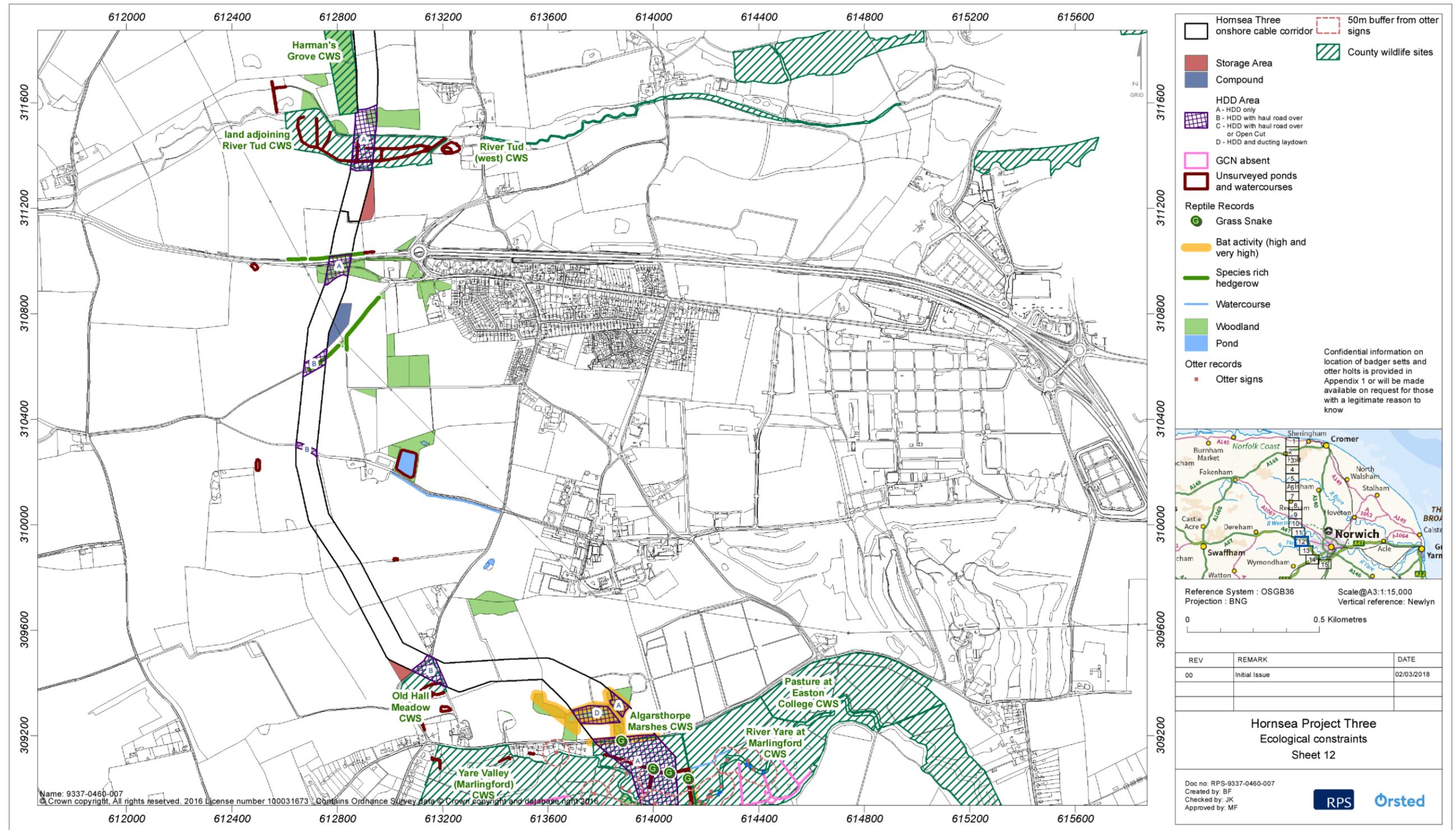


Figure 3.2: Ecological constraints

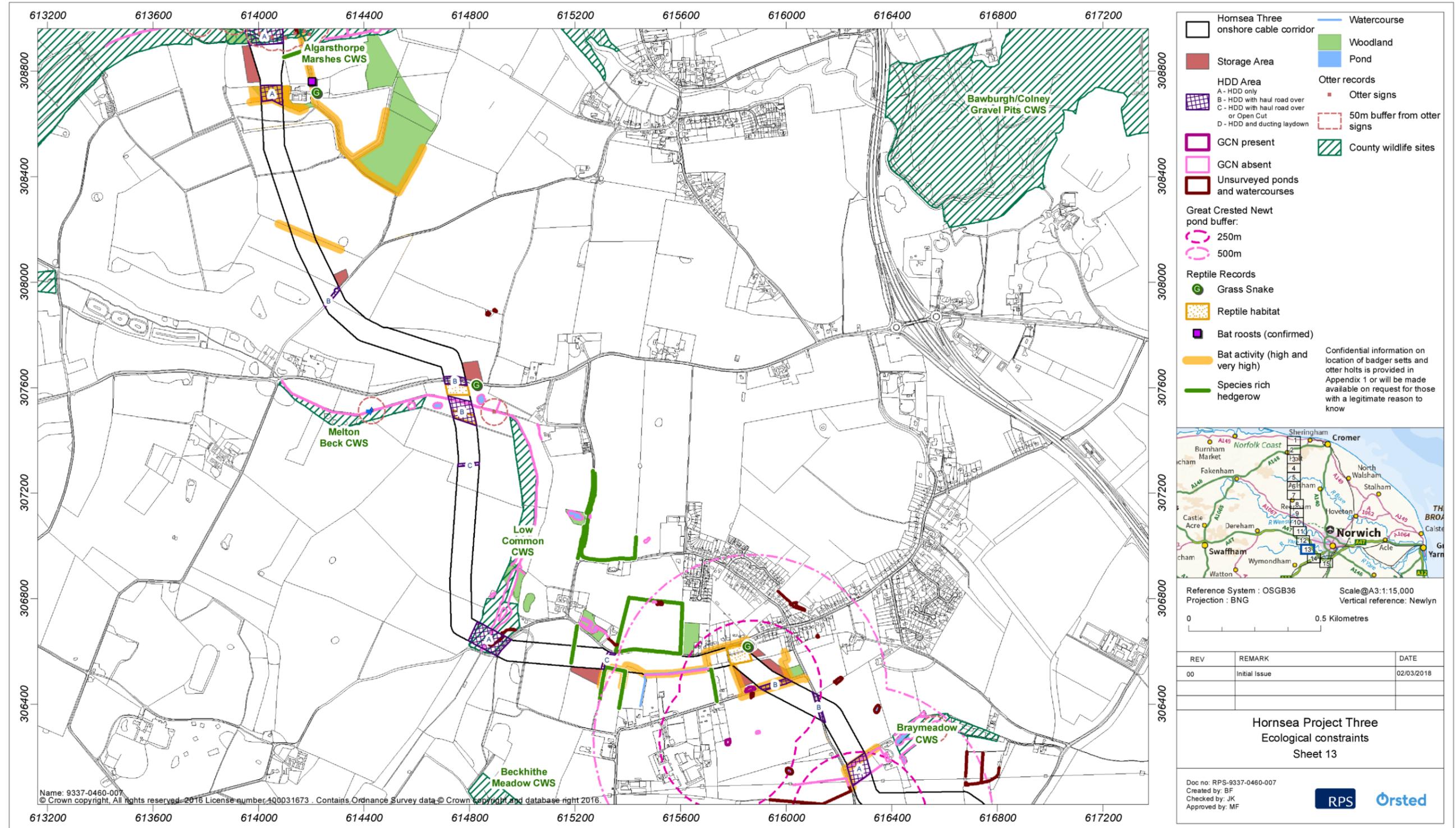


Figure 3.2: Ecological constraints

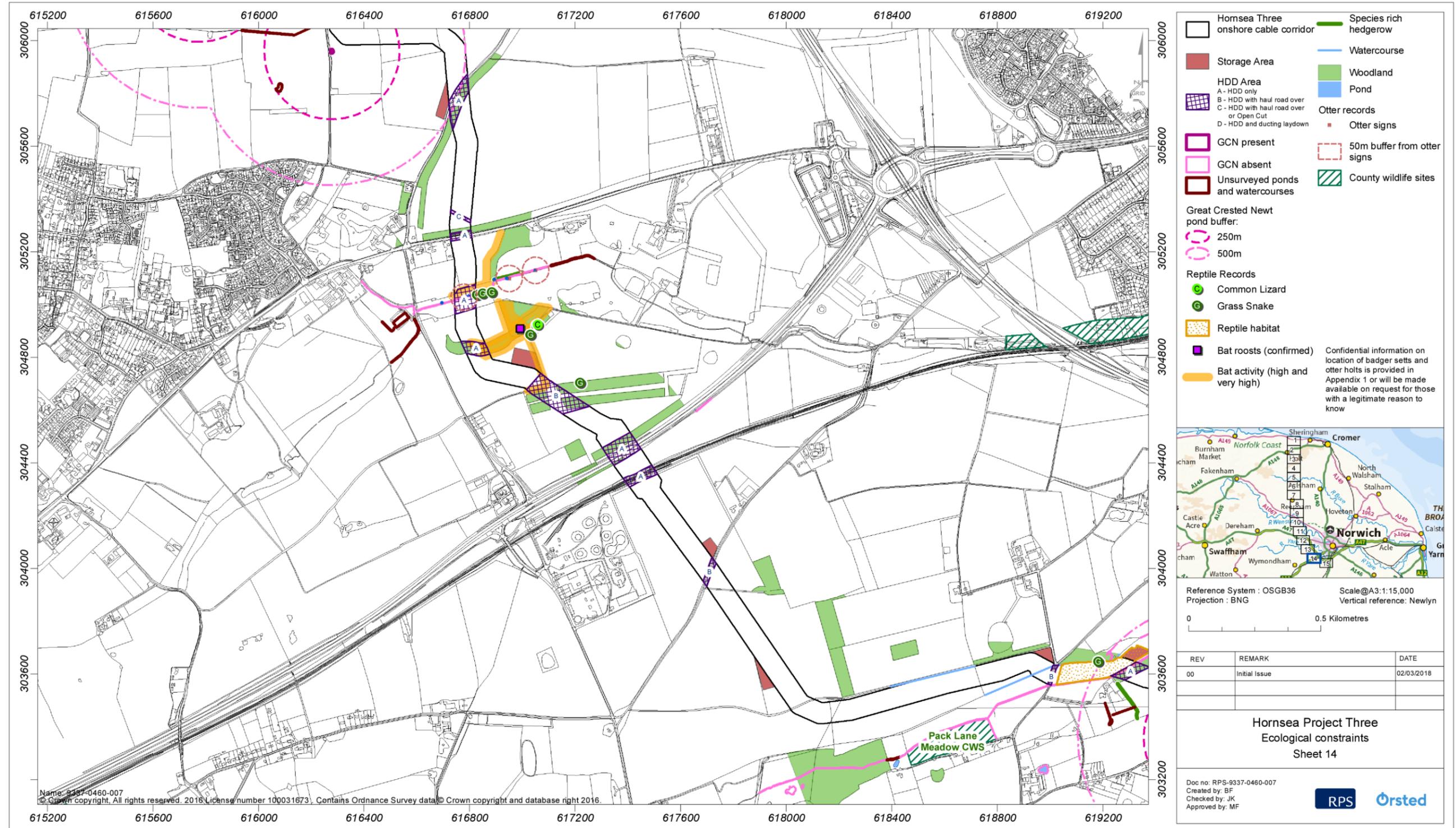


Figure 3.2: Ecological constraints

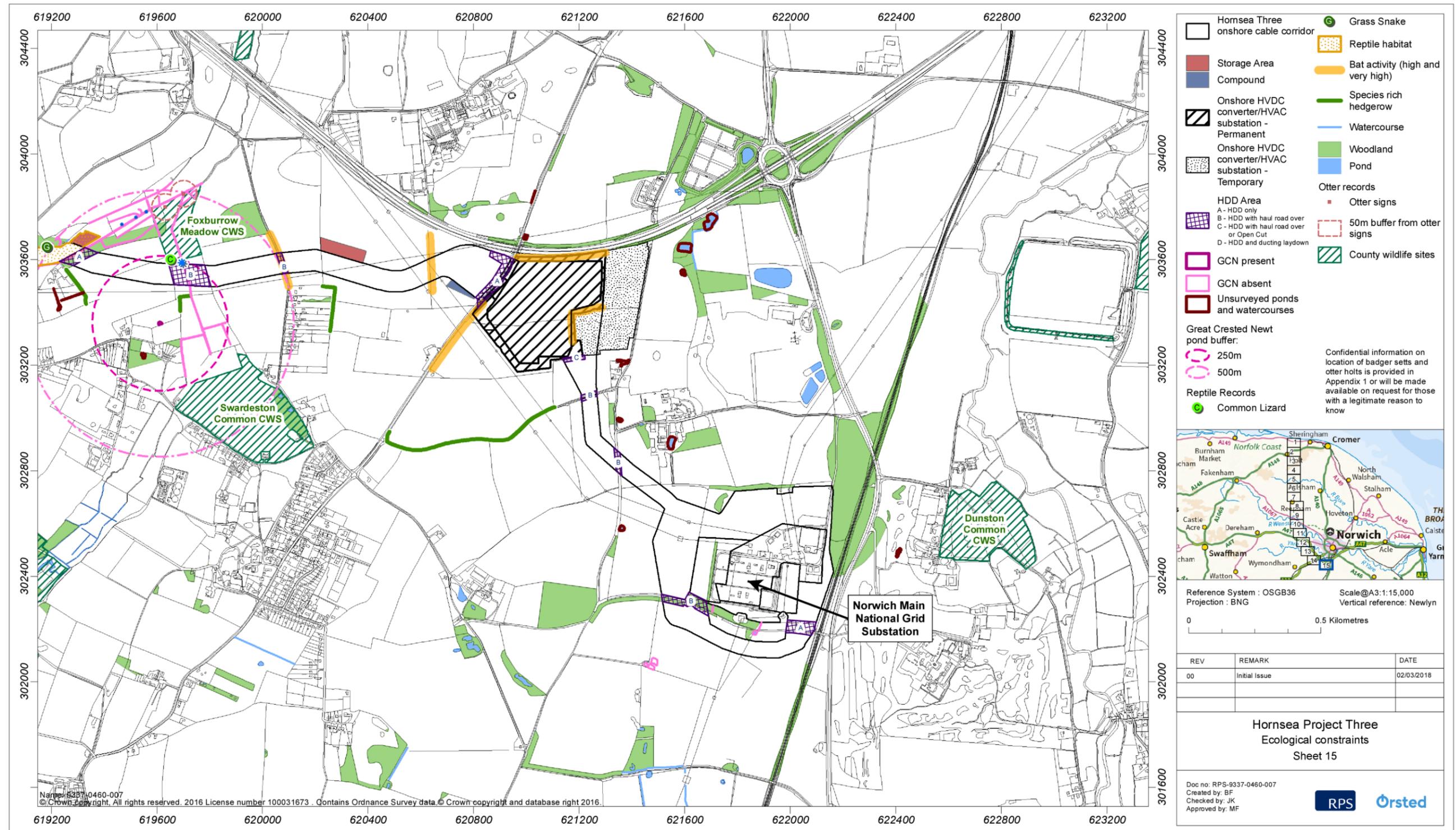


Figure 3.2: Ecological constraints

3.7.4 Future baseline scenario

3.7.4.1 The EIA Regulations require consideration of the likely evolution of the baseline conditions over time, without the implementation of the project. Therefore, an assessment of the future baseline conditions (in the absence of Hornsea Three) has been carried out and is described within this section.

Climate change

3.7.4.2 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 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.

3.7.4.3 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 in character.

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. Moorcroft & Speakman (2015) summarise 17 technical papers produced by leading experts on the impacts of climate change on habitats and species in the UK. They conclude that there is strong evidence that climate change is affecting UK biodiversity. Impacts are expected to increase as the magnitude of climate change increases.

3.7.4.5 The distributions of many species are shifting northwards, including some species which have colonised the UK from mainland Europe. There are also examples of species distributions shifting to higher altitudes. Observed changes in distributions differ between species, and some of this difference is likely to be explained by effects of habitat fragmentation on dispersal ability for some species more than others.

3.7.4.6 Species populations and habitats have been affected by variations in rainfall and extreme weather events, particularly drought. Projected changes in these variables as a result of climate change could have a major impact on biodiversity and ecosystems. Some habitats are particularly sensitive to climate change, with the habitats most likely to be affected being montane habitats (from temperature rises), wetlands (from changes in hydrological processes and availability of water) and coastal habitats (from sea-level rise).

3.7.4.7 While the responses of species and habitats can be hard to predict with any great degree of certainty as there is much that is not known about habitats, their response to changing conditions and interactions between climate change and changes in management, some qualitative observations of potential climate change impacts on habitats and species that occur in the vicinity of Hornsea Three are outlined below, summarised from Moorcroft & Speakman (2015):

- Wetlands: Reduction in summer rainfall would adversely affect many wetland habitats. Lowland fens are particularly likely to be under increasing threat in south east England. Human-induced impacts from drainage and use of fertilisers have had a greater impact than climate change on freshwater ecology to date.
- Grasslands: Some grasslands are likely to be very sensitive to changes in rainfall, particularly those that are associated with waterlogged conditions for part or all of the year. An increase in summer droughts could lead to a decline in distinctive wet grassland communities, including water meadows and rush pastures.
- Woodlands: Beech, birch and sycamore are more sensitive to drought than other species. Increased frequency and / or severity of drought could lead to major changes in the composition and structure of woodland.
- Reptiles and amphibians: Reductions in frog and toad populations are consistent with low summer rainfall and consequent lower soil moisture during drier summers between 2003 and 2006, alongside other factors such as habitat loss. Common lizards, smooth newts and adders are projected to lose suitable climatic conditions across England under many climate change scenarios, but may expand their range in Scotland.
- Wintering birds: a number of wintering wildfowl and wader species have declined significantly in their abundance in the UK, particularly in west coast estuaries, as they migrate shorter distances in the non-breeding season and many have shifted north-eastwards to new feeding grounds. The main wintering bird species considered in this chapter is pink-footed goose. This species has increased in numbers in Britain (long-term trend (1988/89 – 2013/14): 108% increase; ten-year trend (2003/04-2013/14): 37% increase (WWT, 2018), and therefore on current evidence does not appear to be exhibiting a negative response to climate change.
- Mammals: Climate change may affect bat populations through changes in their yearly hibernation cycle, breeding success and food availability. Reduced water flow in rivers would adversely affect water voles and otters. Milder winters could result in increasing populations of some species such as badgers as a result of increasing food availability and an earlier onset of spring.

3.7.4.8 Thus, the potential effects of climate change on the future ecological baseline should be considered, where possible, recognising that ecosystems are complex and are affected by a wide range of factors, and that there are limited data and modelling capability.

3.7.4.9 Whilst there may be some changes in the longer term, land management is likely to have a greater influence on biodiversity over much of the study area within the timescale of construction of Hornsea Three, which is when the majority of effects from the project would occur. Distributions of species are likely to have changed by the time decommissioning occurs but given that the majority of habitat directly affected is farmland, it is still considered likely that land use will be the main influence on species distributions.

Medium and long-term temporal change

3.7.4.10 The following sections consider known trends in distribution or abundance in species present in the study area for Hornsea Three. It is considered that land use is likely to be the key predictor of species distributions over the lifetime of the scheme, given that the majority of habitats affected by the works are arable and grassland farmland habitats:

- GCN: A lowland species, widespread across most of England, undergoing a general decline primarily as a result of habitat loss and the effects of habitat fragmentation.
- Reptiles: Most common species of reptile (grass snake, slow worm and common lizard) are widespread across England but considered to be in decline as a result of habitat loss and the effects of habitat fragmentation.
- Wintering pink-footed goose: This species has increased in numbers in Britain (long-term trend (1988/89 – 2013/14): 108% increase; ten-year trend (2003/04- 2013/14): 37% increase (WWT, 2018)
- Breeding farmland birds: the BTO breeding farmland bird index has declined by 56% since 1970. This pattern of long-term decline has been apparent for many years. The rate of decline in recent years is not as steep as previously, but in general farmland birds remain in decline across the UK.
- Bats: The Bat Conservation Trust (2017) examined trends in 11 species compared to a baseline year of 1999. This found that these species were either stable or increasing. Species with increasing populations relevant to Hornsea Three are common and soprano pipistrelle.
- Water voles: Water vole populations are in major decline; the species used to be found in nearly every waterway in England, Scotland and Wales but are now thought to have been lost in up to 90% of these sites. Threats include habitat loss and fragmentation, water pollution and predation by American mink in the last 30 years.
- Otters: distribution of otters has increased across England over the past 25 years and many rivers are being recolonised by this species.

3.7.4.11 To provide information on medium-term changes in species distribution, and due to the mobile nature of several species of conservation concern which may be impacted by Hornsea Three, pre-construction surveys would be necessary prior to the commencement of construction and decommissioning 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 (see Table 3.21).

3.7.5 Data limitations

3.7.5.1 All seasonally dependent surveys were undertaken at optimal times of the year and under suitable weather conditions. Therefore, survey timing did not represent a data limitation for the assessment.

3.7.5.2 As noted in the accompanying baseline reports (see volume 6, annex 3.1 – 3.13), it was not possible to obtain access to survey every area which may be impacted by Hornsea Three and has the potential to support protected species. Pre-construction surveys, informed by existing data for protected species, will be carried out to identify potential changes in baseline conditions, undertaken within 12 months prior to the commencement of construction works (see Table 3.19).

3.7.5.3 However, appropriate assumptions based on the information available have been made for the purposes of assessment and the baseline ecological surveys are considered to be appropriate to inform a robust impact assessment of the onshore elements of Hornsea Three.

3.8 Key parameters for assessment

3.8.1 Maximum design scenario

3.8.1.1 The assessment scenarios listed in Table 3.14 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.

3.8.2 Impacts scoped out of the assessment

3.8.2.1 On the basis of the baseline environment and the project description outlined in volume 1, chapter 3: Project Description, a number of impacts are proposed to be scoped out of the assessment for ecology and nature conservation. These impacts are outlined, together with a justification for scoping them out, in Table 3.15.

Table 3.14: 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 open cut trenching and installation of cables to cause loss of hedgerow habitat	<p><u>Hornsea Three landfall area</u></p> <p>Open cut at the Hornsea Three landfall area including:</p> <ul style="list-style-type: none"> Up to 42,000 m² compound area and up to 1,500 m² from transition joint bays (based on 250 m² x 6); Up to six cables Corridor width up to 240 m wide (comprising six cables (with installation area up to 15 m) plus up to 20 m separation between each cable. <p>The maximum duration over which works would occur at the landfall would be 5.5 years (assuming a three year gap between the two phases).</p> <p><u>Hornsea Three onshore cable corridor</u></p> <p>Construction activities within corridor measuring up to 4,400,000 m² (80 m x 55,000 m) including:</p> <ul style="list-style-type: none"> Up to 1,650,000 m² (5 m x 55,000 m x 6) from installation of up to six cable trenches; On average 0.6 m stabilised backfill in each 2 m deep trench; Up to 99,000 m² from jointing bays (based on 440 jointing bays (each jointing bay is 9 m x 25 m)). Up to 3,960 m² from link boxes (based on 440 link boxes (each link box: is 3 m x 3 m)). Link boxes are permanent sub surface structures; Up to 396,000 m² from installation of temporary haul road/access tracks (6 m x 66,000 m per phase). <p>The maximum duration of construction could occur at the onshore cable corridor would be 5.5 years incorporating two phases (assuming a three-year gap between the two phases). The work in each phase is expected to progress along the Hornsea Three onshore cable corridor with a typical active construction works duration of three months at any particular location.</p> <p>Up to five minor watercourses and drainage channels to be crossed via an open cut trenching method. The open cut cable crossing methodology is described in volume 1, chapter 3: Project Description.</p>	<p>The maximum design scenario for habitat loss is the use of open cut techniques due to the greater footprint required, compared to HDD. Consequently, this would also be the maximum design scenario for habitat loss and severance impacts on GCN, reptiles, bats and badgers.</p> <p>The maximum design scenario for disturbance to surface water resources would result from the use of open cut, temporary bridging and culverts. The HVAC transmission represents the maximum design scenario due to the greater number of cables required as this would result in the largest possible area of disturbance to surface water resources. Consequently, this would also be the maximum design scenario for impacts on water voles and otters.</p> <p>The maximum design scenario for impacts arising from airborne pollutants is the use of open cut techniques due to the greater footprint required and, consequently, the greater area of excavation and soil disturbance, compared to HDD. This results in a consequent increase in the potential for dust impacts.</p> <p>The maximum design scenario for disturbance impacts to birds is the use of open cut techniques due to the greater area of habitat affected and, consequently, the larger area affected by construction activity, compared to HDD.</p> <p>The maximum design scenario for all of the above impacts on ecology associated with the onshore cable corridor is the HVAC transmission due to the greater number of cable trenches required and, therefore, the greatest area of land affected.</p> <p>The maximum design scenario in terms of the duration of these impacts would be the two-phase cabling operation, which would require impacts to occur twice in each location. In some cases (such as hedgerows), hedgerows would not be likely to become fully established and mature in the period between phases.</p>
Potential for open cut trenching and installation of cables to cause loss, damage to and disturbance of woodland		
Potential for open cut trenching and installation of cables leading to habitat loss and/or severance for GCN		
Potential for open cut trenching and installation of cables leading to habitat loss and/or severance for reptiles		
Potential for open cut trenching and installation of cables to cause disturbance to bats		
Potential for open cut trenching and installation of cables to cause habitat loss and disturbance to badgers		
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 damage to designated sites from runoff pollutants		
Potential for open cut trenching and installation of cables to cause damage to habitats from runoff pollutants		
Potential for open cut trenching and installation of cables to cause disturbance to water voles		
Potential for open cut trenching and installation of cables to cause disturbance to otters		
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 disturbance to birds that are designated features of the North Norfolk Coast SPA/Ramsar		
Potential for open cut trenching and installation of cables to cause disturbance to other wintering birds that are designated features of the North Norfolk Coast SPA/Ramsar		
Potential for open cut trenching and installation of cables to cause disturbance to breeding birds		
Potential for permanent habitat loss from construction of onshore infrastructure have adverse impacts on habitats	<p><u>Onshore HVDC converter/HVAC substation</u></p> <p>Up to 149,302 m² for permanent area of site (including an area which may be used for landscaping) plus a temporary works area of approximately 91,000 m².</p>	<p>The HVAC transmission option represents the maximum design scenario for affecting ecological receptors due to the potential need for the onshore HVAC booster station resulting in the greatest area of habitat loss and disturbance.</p>
Potential for permanent habitat loss from construction of onshore infrastructure to have adverse impacts on species		

Potential impact	Maximum design scenario	Justification
Potential for permanent habitat loss from construction of onshore infrastructure to have adverse impacts on wintering birds	<p>Maximum building dimensions: up to 220 m length, 75 m width and 25 m height for main buildings.</p> <p>The maximum duration of onshore construction could occur at the onshore HVDC converter/HVAC substation would be six years incorporating two phases assuming a three year gap between the two phases.</p> <p><u>Onshore HVAC booster station</u></p> <p>Up to 30,407 m² for permanent area of site plus a temporary works area up to 25,000 m².</p> <p>Maximum building footprint of 9,000 m² (based on single building scenario (120 m length and 75 m width) and height up to 12.5 m). The maximum duration over which construction could occur at the onshore HVAC booster station would be five years incorporating two phases assuming a three year gap with no construction activity between the two phases.</p>	The dimensions of the main buildings at the onshore HVDC converter/HVAC substation represents the maximum design scenario as it has the largest potential for habitat loss and disturbance.
Potential for HDD beneath watercourses to cause damage and disturbance to designated sites	<ul style="list-style-type: none"> Up to 120 HDD locations per phase (up to 105 minor HDDs and 15 major HDDs per phase), up to 54,000 m² from major HDD compounds (based on 15 HDD compounds (each compound is 60 m x 60 m). <p>Contamination via runoff from works as a result of spillages at HDD works.</p>	HDD under designated sites is part of designed-in mitigation to avoid direct impacts from open trenching in designated sites. Therefore, the maximum design scenario for impacts on designated sites and habitats would result from the risk of HDD techniques indirectly contaminating surface watercourses or other sensitive habitats where they are hydraulically connected with surface runoff caused by spillages and the movement of sediment.
Potential for HDD beneath watercourses to cause damage and disturbance to other watercourses and habitats		HDD under habitats of ecological value such as watercourses and woodlands is part of designed-in mitigation to avoid direct impacts from open trenching on these habitats. Therefore the maximum design scenario for effects on habitats and associated species would result from the risk of HDD crossing techniques indirectly contaminating surface watercourses or other sensitive habitats where they are hydraulically connected with surface runoff caused by spillages and the movement of sediment, and by disturbance impacts during construction.
Potential for HDD beneath watercourses to cause habitat loss and disturbance to protected species		
Potential for construction of onshore infrastructure to have adverse impacts on designated sites from airborne pollutants	<p><u>Onshore HVDC converter/HVAC substation</u></p> <p>Up to 149,302 m² for permanent area of site (including an area which may be used for landscaping) plus a temporary works area of approximately 91,000 m².</p> <p>Maximum building dimensions: up to 220 m length, 75 m width and 25 m height for main buildings.</p> <p>The maximum duration of onshore construction could occur at the onshore HVDC converter/HVAC substation would be six years incorporating two phases assuming a three year gap between the two phases.</p> <p><u>Onshore HVAC booster station</u></p> <p>Up to 30,407 m² for permanent area of site plus a temporary works area up to 25,000 m².</p> <p>Maximum building footprint of 9,000 m² (based on single building scenario (120 m length and 75 m width) and height up to 12.5 m). The maximum duration over which construction could occur at the onshore HVAC booster station would be five years incorporating two phases assuming a three year gap with no construction activity between the two phases.</p>	<p>The maximum design scenario in terms of ecological effects arising from the onshore HVAC booster station is associated with the HVAC transmission as the booster station is not required for the HVDC transmission.</p> <p>The dimensions of the main buildings at the onshore HVDC converter/HVAC substation represents the maximum design scenario in terms of ecological effects as it results in the largest possible area of disturbance and, therefore, greatest potential for runoff or airborne pollutants.</p>
Potential for construction of onshore infrastructure to cause damage to designated sites from runoff 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 runoff pollutants		
Potential for temporary habitat loss from construction of construction compounds to have adverse impacts on habitats	<p>Temporary compounds in locations as described in volume 1, chapter 3: Project Description</p> <ul style="list-style-type: none"> Up to 120 HDD locations per phase (up to 105 minor HDDs and 15 major HDDs per phase), up to 54,000 m² from major HDD compounds (based on 15 HDD compounds (each compound is 60 m x 60 m); 	The maximum design scenario in terms of the duration of impacts/number of occurrences would be the two-phase cabling operation, which would require HDD in each phase.
Potential for construction of construction compounds to have adverse impacts on designated sites from airborne pollutants		

Potential impact	Maximum design scenario	Justification
Potential for construction of temporary compounds to cause damage to designated sites from runoff pollutants	<ul style="list-style-type: none"> Up to five secondary compounds; Up to 55 storage areas; and Up to 99,000 m² from jointing bays (based on 440 jointing bays (each jointing bay is 9 m x 25 m)). 	HDD is part of designed-in mitigation to avoid direct impacts from open trenching for key receptors. The maximum design scenario would be the HVAC transmission option due to the greater number of cable trenches required (and therefore the greater number of HDDs, jointing bays etc).
Potential for construction of temporary construction compounds to have adverse impacts on habitats from airborne pollutants		
Potential for construction of temporary compounds to cause damage to habitats from runoff pollutants		
Potential for temporary habitat loss from construction of construction compounds to have adverse impacts on species		
Potential for temporary habitat loss from construction of construction compounds to have adverse impacts on wintering birds		
Potential for temporary habitat loss from construction of access tracks to have adverse impacts on designated sites	<ul style="list-style-type: none"> Up to 396,000 m² from installation of temporary haul road/access tracks (6 m x 66,000 m per phase); Haul road construction by soil stabilisation. 	<p>The maximum design scenario in terms of the duration of impacts/number of occurrences would be the two-phase cabling operation, which would require temporary haul routes for each phase.</p> <p>The maximum design scenario in terms of the construction of haul roads would be the use of soil stabilisation techniques as this 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.</p>
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 runoff pollutants		
Potential for construction and use of access tracks to have adverse impacts on habitats from airborne pollutants		
Potential for construction and use of access tracks to cause damage to habitats from runoff 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 and maintenance phase		
Potential for operation to result in low-level visual disturbance, and noise and vibration disturbance of habitats and species during routine maintenance operations	Routine maintenance of onshore HVDC converter/HVAC substation and HVAC booster station.	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, which would also require maintenance.
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		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.
Decommissioning phase		
Potential for decommissioning of HVAC booster station and onshore HVDC converter/HVAC substation to affect designated sites	See overleaf	See overleaf

Potential impact	Maximum design scenario	Justification
Potential for decommissioning of HVAC booster station and onshore HVDC converter/HVAC substation to affect habitats	Complete decommissioning of the onshore HVAC booster station and onshore HVDC converter/HVAC substation. Both would be removed and the site reinstated to its original function or for alternative use.	The maximum design scenario during decommissioning is the removal of the onshore HVDC converter/HVAC substation and onshore HVAC booster station as this presents the greatest disturbance and potential risk of sediment and contaminants being released.
Potential for decommissioning of onshore HVDC converter/HVAC substation and HVAC booster station to affect species		

Table 3.15: Impacts scoped out of the assessment for ecology and nature conservation.

Potential impact	Justification
Construction phase	
Potential for open cut trenching and installation of cables to cause habitat loss within designated sites	All designated sites are either avoided by the onshore cable corridor, or, where this was not possible, HDD will be undertaken under all designated sites that are partially within the onshore cable corridor. There is therefore no potential for open trenching to cause direct habitat loss within designated sites.
Potential for open cut trenching and installation of cables to cause loss, damage to and disturbance of ponds	No ponds within the onshore cable corridor will be affected by open trenching works.
All impacts on Desmoulin's whorl snail and narrow-mouthed whorl snail	Surveys have not found this species to be present, and HDD will be employed under all 'main' and numerous 'ordinary' watercourses.
All impacts on fish	HDD will be employed under all 'main' watercourses, and these are the watercourses likely to support fish populations. HDD is also proposed for the majority of 'ordinary' watercourses. There are some 'ordinary' watercourses to be crossed by open trenching, or where HDD is proposed but a haul road is also required. It is not considered that these watercourses would support fish populations of conservation significance. Measures documented in the Outline CoCP (document reference A8.5) will be employed to minimise impacts on watercourse, and any supported fish, from open cut trenching and haul road construction.
Potential for open cut trenching and installation of cables leading to habitat loss and/or severance for white clawed crayfish	All watercourses currently known to support white clawed crayfish will be crossed using HDD. No impacts from habitat loss or severance would therefore occur on this species.
Potential for permanent habitat loss from construction of onshore infrastructure have adverse impacts on habitats	Habitats within areas of permanent land take are arable habitats of minimal intrinsic conservation interest.
Potential for HDD to cause disturbance to badgers	Badger setts located in HDD areas would need to be closed due to potential effects of drilling on the setts), so once closures of setts (if required) has been undertaken, there would be no retained badger setts close enough to HDD locations for disturbance to occur
Operation and maintenance phase	
Impacts of operation may affect designated sites and watercourses from thermal effects of underground power cables.	The thermal impacts of the underground cable are considered in chapter 1: Geology and Ground Conditions. The thermal effects of properly installed cables in a thermally stabilised layer will be undetectable more than 1,200 mm from the cables in both horizontal and vertical planes, which is less than the buried depth of the cables beneath watercourses. The assessment of thermal impacts concluded that the impact would be of negligible magnitude and it is not therefore considered that there is any potential for impacts on ecological features.
Impacts of operation may affect species in watercourses from EMF effects of underground power cables.	The desk study and site-specific surveys have not identified species present that are known to be particularly sensitive to EMF (such as salmon). EMFs reduce rapidly over a short distance (see volume 4, annex 3.3: EMF Compliance Statement) and are widely present within the study area associated with cables, overhead lines etc. It is not considered that significant effects on any of the identified receptors are likely.
Habitat loss within designated sites	Operation will not involve works within designated sites.
Habitat loss for species VERs	Operation will not involve loss of habitat used by species VERs.
Habitat fragmentation for species VERs	Operation will not involve loss of habitat used by species VERs and hence no fragmentation effects would occur.
Any impacts from habitat loss	All permanent and temporary habitat losses occur during construction. Impacts of habitat loss (including impacts of species arising from habitat loss) are assessed in the construction phase. No additional impacts from habitat loss will occur during operation.

Potential impact	Justification
Decommissioning phase	
Impacts of decommissioning the onshore cable corridor may affect designated sites, habitats and disturbance to species.	The decommissioning of the onshore cable corridor will comprise the cutting and sealing of the cables and removal of the link boxes (where feasible). The effect on habitats and species is unlikely to be significant.
Habitat loss within designated sites	Decommissioning will not involve works within designated sites.
Habitat loss for species VERs	Decommissioning will not involve loss of habitat used by species VERs.
Habitat fragmentation for species VERs	Decommissioning will not involve loss of habitat used by species VERs and hence no fragmentation effects would occur.

3.9 Impact assessment methodology

3.9.1 Overview

3.9.1.1 The ecology and nature conservation assessment has followed the methodology set out in volume 1, chapter 5: Environmental Impact Assessment Methodology. Specific to the ecology and nature conservation assessment, the following guidance documents have also been considered:

- Guidelines for Ecological Impact Assessment in the United Kingdom (Chartered Institute of Ecology and Environmental Management (CIEEM), 2016).

3.9.1.2 In addition, the ecology and nature conservation assessment has considered the legislative framework as defined by the legislation summarised in section 3.4.

3.9.2 Determining the sensitivity of the receptor

3.9.2.1 The approach to determining the nature conservation value of each VER is outlined in Table 3.16 below.

3.9.2.2 Sensitivity takes into account the value of a VER as well as vulnerability and recoverability. Therefore, while value is usually the primary consideration when determining sensitivity, professional judgment is also used to determine how sensitive a VER may be to impacts when these other factors are considered.

Table 3.16: Definition of terms relating to the value 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.

Sensitivity	Definition used in this chapter
Low (or lower)	A feature of importance at district level. A feature (e.g. habitat or population) that is of nature conservation value in a local context only, with insufficient value to merit a formal nature conservation designation.
Negligible	A feature of importance at local level. Commonplace feature of little or no habitat/historical significance. Loss of such a feature would not be seen as detrimental to the ecology of the area.

3.9.3 Determining the magnitude of impact

3.9.3.1 The likely impacts of Hornsea Three are determined through understanding how each VER would be affected by the onshore elements of Hornsea Three. In this assessment, the following have 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).

3.9.3.2 The criteria for defining magnitude in this chapter are outlined in Table 3.17. In Table 3.17, 'integrity' for sites is defined as the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and / or the levels of populations of the species for which it is classified.

Table 3.17: 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 site VER or the conservation status of a species or species assemblage VER.
Moderate	The impact adversely affects a VER but is unlikely to adversely affect its integrity or conservation status.
Minor	The impact adversely affects a VER but would not adversely affect its integrity or conservation status.
Negligible	There would be minimal effect on the VER.
No change	There would be no detectable change from the baseline condition of the VER.

- 3.9.3.3 The significance of the effect upon ecology and nature conservation receptors 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 3.18. Where a range of significance levels is presented in Table 3.18, the final assessment for each effect is based upon expert judgement.
- 3.9.3.4 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 3.18: Matrix used for the assessment of the significance of the effect.

		Magnitude of impact				
		No change	Negligible	Minor	Moderate	Major
Sensitivity of receptor	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

Designated sites

- 3.9.3.5 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 (the full assessment of potential effects on the integrity of Natura 2000 sites is contained within the RIAA (document reference A5.2) for Hornsea Three).
- 3.9.3.6 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 (see document reference A5.2) for Hornsea Three), the effect has been assessed using the higher value site as the receptor. This is because impacts 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 Hornsea Three ecology and nature conservation study area, an assessment of the effects on the overall site is made in this chapter using the methodology outlined above.

- 3.9.3.7 The RIAA (document reference A5.2) has been prepared in accordance with Advice Note Ten: Habitats Regulations Assessment Relevant to Nationally Significant Infrastructure Projects (PINS, 2017) and has been 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 designed-in mitigation measures have been identified to reduce the potential for impacts on ecology and nature conservation (see Table 3.19). As there is a commitment to implementing these measures, they are considered inherently part of the design of Hornsea Three and have therefore been considered in the assessment presented in section 3.11 below (i.e. the determination of magnitude and therefore significance assumes implementation of those measures). These measures are considered standard industry practice for this type of development.
- 3.10.1.2 The Hornsea Three onshore cable corridor refinement process has had regard to sensitive and designated sites and, where possible, such sites have been avoided either physically, or through selection of cable installation methodologies in those locations to minimise any potential impacts upon them, for example, using HDD to cross such locations.

Table 3.19: 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	
Use of HDD installation method beneath 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 Hornsea Three onshore cable corridor has been developed to avoid designated sites, areas of woodland and other ecologically sensitive habitats wherever practicable.	To minimise loss of habitats of conservation interest.
Other VER features such as ponds have been avoided in the selection of the onshore cable corridor alignment and local features such as standard trees and hedgerows 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 onshore cable corridor alignment to provide an appropriate buffer from construction and operation works. The width of these buffer zones will be developed in accordance with standard industry requirement and best practice guidance, and are 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 12 months prior to the commencement of construction 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 onshore cable corridor may 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 12 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. Natural England 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, licenced ecologist, in accordance with the licence requirements.	To provide up to date information to ensure compliance with legal requirements and, where relevant, trigger the implementation of mitigation measures set out in the Outline CoCP (document reference A8.5) and EMP (document reference A8.6).
Surveys will include pre-construction surveys (in line with the appropriate methodology to establish presence / absence as per previous surveys) (volume 6, annex 3.5: Great Crested Newt Survey) 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 undertake the 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 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 HDD installation launch pits will be located, using bird scarers during the breeding season (no bird scarers will be employed in February in areas from Kelling to the landfall where wintering pink-footed geese might be affected).	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 HDD 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 a Natural England 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.
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 Natural England, which will be obtained prior to the commencement/continuance of works that could affect the roost.	To help ensure the protection of bats.

Measures adopted as part of Hornsea Three	Justification
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 the CoCP. An Outline CoCP accompanies the application for development consent (document reference A8.5).	To minimise the likely impacts on ecology and nature conservation features of interest, including biosecurity measures to prevent spread of invasive species.
Site induction and toolbox talks will include mitigation requirements included in this chapter and in the Outline EMP (document reference A8.6).	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 to ensure, as far as practicable, that 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.
Topsoil and subsoil heaps will be located at adequate distances so as to ensure the protection of the retained soils.	To minimise impacts on soil structure and ecology.
Night working will be avoided where practicable. However, it may be necessary to carry out works during night time hours, such as during HDD installation operations, 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 groundwater 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 are set out in chapter 2: Hydrology and Flood Risk and are described in the Outline CoCP (document reference A8.5). Measures will include the provision of a pollution incident response plan and a drainage management plan to minimise potential pollution effects. Measures to be taken during HDD in relation to handling of bentonite, if required, and the requirement for plans to be produced for HDD beneath watercourses (to minimise the risk of pollution) are included in the Outline CoCP.	To minimise the potential for pollution incidents to affect habitats.
<p>The length of individual hedgerow sections to be removed will be reduced as far as reasonably practicable according to construction methods.</p> <p>A works-free buffer zone will be established around mature trees, of 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.</p> <p>All sections of hedgerow removed to enable construction of the onshore cable 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 Hornsea Three onshore cable corridor. In addition, enhancement planting to improve connectivity and/or native species diversity will be considered on a case by case basis. Enhancement planting will include the planting of native hedgerow trees, typical of the area, at a suitable distance from the onshore cable corridor.</p> <p>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 landscape and visual impact assessment.</p> <p>Planting and management of any reinstated areas will be undertaken in accordance with the Outline EMP. Detailed landscaping proposals will be developed in an outline Landscape Management Plan. Planting will be undertaken as soon as practicable and once it can 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.</p>	<p>To minimise the likely impacts on habitats.</p> <p>To mitigate the effects of the temporary loss of hedgerow habitat on species such as bats.</p>
Where considered necessary by the ECoW, or required under an EPS licence obtained from Natural England, 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.

Measures adopted as part of Hornsea Three	Justification
<p>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.</p> <p>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.</p>	<p>To minimise the potential impacts on reptiles.</p>
<p>A biosecurity protocol will be implemented to minimise risk of spreading invasive species. The main risks are associated with transfer of aquatic plants or animals (including vectors for disease) between watercourses or waterbodies. The majority of watercourse crossings are being undertaken using HDD, and no ponds are directly affected but where working in or near water, control measures will be implemented. These are documented in the Outline CoCP (document reference A8.5) and include:</p> <ul style="list-style-type: none"> • Ensuring vehicle tyres and wheel arches are cleared of mud, plants and other organic material before moving from one watercourse to another; • Leaving removed material on site; and • Cleaning boots and disinfecting (away from waterbodies to prevent potential pollutant incidents) all equipment that might come into contact with water. <p>Appropriate measures will also be adopted when working in the vicinity of invasive terrestrial plants. Where necessary, works will be supervised by the ECoW. Known locations of invasive plant species will be marked on site and vehicle movements restricted in the vicinity of these locations. Any spoil containing or likely to contain invasive plant material to be stored separately from non-contaminated spoil, and treated as appropriate, with control measures adopted.</p>	<p>To minimise the potential risk of spreading disease and invasive species.</p>
<p>In addition to measures to minimise the potential for pollution incidents, HDD is proposed for all 'main' and numerous 'ordinary' watercourses, including:</p> <ul style="list-style-type: none"> • River Glaven headwaters and tributaries; • 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; • Low Common CWS; and • Intwood Stream. <p>Other locations for HDD installation include:</p> <ul style="list-style-type: none"> • Old Hall Meadow CWS; and • Algarsthorpe Meadows <p>Where HDD 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.</p> <p>Drilling is expected to achieve at least 1.5 m beneath any watercourses.</p> <p>Where considered necessary by the ECoW, high visibility fencing will be erected between the watercourses and adjacent riparian habitat and the works areas to prevent access by workers and heavy machinery, and to prevent storage of equipment or materials within this zone. To prevent water voles and other animals from becoming trapped in the HDD installation pits, exclusion fencing will be installed around HDD installation pits where considered necessary by the ECoW.</p>	<p>To minimise the potential impacts on water voles and otters.</p>

Measures adopted as part of Hornsea Three	Justification
<p>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.</p> <p>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:</p> <ul style="list-style-type: none"> • 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 Hornsea Three onshore cable corridor, to control the movement of personnel and vehicles. <p>Works will be conducted in accordance with Natural England 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” (Arnott, 2001). Works will also take into account best practice guidelines published in Strachan <i>et al.</i> (2011).</p>	<p>To minimise the potential impacts on water voles.</p>
<p>Cable installation by HDD beneath watercourses of value to otters will be carried out. HDD installation pits and other excavations 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.</p> <p>Works-free buffer zones will be set up around holts (if found) and any other identified resting place, within which no tracking of heavy machinery, or storage of equipment, machinery or soils will be permitted.</p> <p>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 a minimum where it might affect holts or other identified resting places.</p> <p>Vehicle speeds will be limited whilst on site so as to minimise the potential for animals to be injured by vehicles.</p> <p>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.</p> <p>If pre-construction otter surveys report the presence of a previously unidentified otter holt or resting place within the Hornsea Three onshore cable 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.</p> <p>An EPS licence for otters obtained from Natural England 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 Natural England as to the requirement for an EPS licence, prior to the commencement of works.</p>	<p>To minimise the potential impacts on otters.</p>
<p>In addition to the above-mentioned measures, including those to control vehicle speeds and minimise the likely impacts of light spillage:</p> <ul style="list-style-type: none"> • No construction works will be carried out within minimum distances of an active sett entrance. Works within 30 m of a badger sett entrance may require a Natural England 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, if identified, 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. 	<p>To minimise the potential impacts on badgers.</p>
<p>If work within minimum distances of a sett and, therefore, sett closure or disturbance cannot be avoided, sett closures will need to be carried out outside the badger breeding season (defined as 30 November to 1st July) and in accordance with a Natural England approved method statement and, where relevant, a Natural England licence for badgers.</p> <p>HDD installation launch pits will be located minimum distances from active badger setts, or a Natural England licence for badgers may be required prior to the commencement of works, as considered necessary by an experienced badger ecologist.</p> <p>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 Hornsea Three onshore cable corridor, or in the areas around the HDD installation launch sites, micro siting away from the setts will be undertaken where practicable within the consented boundary of development, or a Natural England licence for badgers may be required before works continue.</p>	<p>To minimise the potential impacts on badgers.</p>

Measures adopted as part of Hornsea Three	Justification
<p>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 are included in the Outline CoCP (document reference A8.5). These measures include:</p> <ul style="list-style-type: none"> • 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 Natural England; and • Use of temporary 'artificial bridges' to provide a link between severed edges of hedgerows and other habitat crossed by the Hornsea Three onshore cable corridor, which have been identified as key commuting/foraging routes. The artificial bridges will be retained <i>in situ</i> 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 <i>in situ</i> during the day when not working in the area. 	<p>To minimise the potential impact on bats.</p>
<p>Post-construction measures</p>	
<p>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 onshore cable corridor to prevent potential damage to cabling. Habitat reinstatement will be undertaken in accordance with a pre-approved Landscape Management Plan. The scheme will include the retention and/or replacement of habitats of nature conservation value wherever practicable.</p>	<p>To minimise the period of time that habitats and species will be affected.</p>
<p>Bat habitat and bat roost creation, restoration or enhancement, with the aim of providing proportionate replacement for habitat lost or damaged, for example:</p> <ul style="list-style-type: none"> • Erection of long-lasting woodcrete 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. 	<p>To minimise the potential impact on bats.</p>
<p>Operation and maintenance measures</p>	
<p>The measures to be adopted for the avoidance of pollution of the environment during the operation of the onshore infrastructure are set out in chapter 2: Hydrology and Flood Risk.</p>	<p>To protect retained habitats and species.</p>
<p>Habitats will be managed in accordance with the Outline EMP (document reference A8.6) and the Landscape Management Plan (document reference A8.7).</p>	<p>To ensure the success of habitat/landscaping proposals.</p>
<p>Decommissioning measures</p>	
<p>Measures to be adopted during decommissioning will be similar to those adopted during construction and will incorporate best practice guidance available at that time. These will be implemented through a decommissioning plan.</p>	<p>To minimise likely impacts on habitats and species of ecological or conservation interest.</p>

3.11 Assessment of significance

3.11.1 Construction Phase

3.11.1.1 The impacts of the onshore construction of Hornsea Three on ecology and nature conservation have been assessed and are listed in Table 3.14, along with the maximum design scenario against which each construction phase impact has been assessed.

3.11.1.2 A description of the predicted effect on ecology and nature conservation receptors caused by each identified impact is given below.

Potential for open cut trenching and installation of cables to cause loss of hedgerow habitat

Magnitude of impact

3.11.1.3 Approximately 14.35 km of hedgerows occur within the Hornsea Three onshore cable corridor, comprising approximately 9.59 km of species-poor hedgerow, 2.68 km of species-rich hedgerow and 2.08 km of unclassified hedgerow³. These lengths are summarised in Table 3.20.

Table 3.20: Hedgerow lengths within onshore cable corridor

Hedgerow type	Onshore cable corridor (excluding areas crossed by HDD)	HDD with haul road over or Open Cut	HDD only	HDD with haul road over	Total
Species rich hedge	1,536	110	542	486	2,675
Species poor hedge	4,125	606	2,242	2,619	9,592
Unclassified hedge	931	85	747	316	2,079
Total	6,593	801	3,531	3,421	14,346

3.11.1.4 Of this total, 3.53 km (comprising 2.24 km of species-poor hedgerow, 0.54 km of species-rich hedgerow and 0.75 km of unclassified hedgerow), lies within HDD areas which would be crossed using HDD techniques and would not therefore be directly affected. A further 3.42 km (comprising 2.62 km of species-poor hedgerow, 0.49 km of species-rich hedgerow and 0.32 km of unclassified hedgerow) lies within areas crossed using HDD but where a haul road will be required across the HDD area. In these cases, existing hedgerow gaps will be used for the haul road crossing point wherever possible and, where this is not possible, hedgerow losses will be minimised to the width of the haul road plus a small working width required for construction, and therefore the majority of these hedgerows will also be retained.

3.11.1.5 Hedgerow loss would therefore comprise approximately 6.59 km in total, comprising 4.13 km of species-poor hedgerow, 1.54 km of species-rich hedgerow and 0.93 km of uncategorised hedgerow for open cut. A further 0.80 km of hedgerow is within areas where HDD or open cut would be employed, and therefore for the purposes of this assessment open cut has been assumed. The maximum hedgerow loss is therefore 7.39 km.

3.11.1.6 This comprises 52% of the hedgerows within the Hornsea Three onshore cable corridor and approximately 12.3% of the hedgerows present in the immediate vicinity (based on the 60 km of hedgerows observed within the 200 m Phase 1 habitat survey area).

3.11.1.7 The maximum design scenario is of a two-phase cable installation with a gap between phases. Replanting of hedgerows would be carried out after the first phase but the replanted hedgerows could then need to be removed to allow for the second phase of construction. The Outline Landscape Management Plan and Outline EMP set out more detailed measures for hedgerow removal and reinstatement.

3.11.1.8 The initial impact is predicted to be of county spatial extent, long term duration, continuous and medium reversibility. It is predicted that the impact will affect the receptor directly. However, the loss of hedgerow habitat is only a small percentage of the total habitat resource in the wider study area. The magnitude is, therefore, considered to be minor.

3.11.1.9 Following completion of construction, there would be a period of a minimum of five years for the new hedgerow planting to fully mature. Given that all hedgerows removed for construction will be replanted with a species-rich mix of native species regardless of their current species-richness, the impact magnitude would be minor positive once the proposed native hedgerows become fully established and mature.

Sensitivity of receptor

3.11.1.10 Native species hedgerows are deemed to be of medium vulnerability, moderate recoverability and medium value. The sensitivity of the receptor is, therefore, considered to be medium.

³ Unclassified hedgerows are those where survey access was not available to determine species rich/poor status.

Significance of the effects

- 3.11.1.11 Overall, the sensitivity of hedgerows is considered to be medium and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms. Furthermore, it is noted that the effect would be **minor positive** once the hedgerow habitat matures after the second phase of construction, as all hedgerows will be replanted with a species-rich native planting mix regardless of current status.

Potential for open cut trenching and installation of cables to cause loss, damage to and disturbance of watercourses

Magnitude of impact

- 3.11.1.12 The Hornsea Three onshore cable corridor has been designed to minimise and avoid, where possible, impacts on existing drainage networks and features. No main watercourses would be crossed via open cut trenching. Two 'ordinary' watercourses will be crossed by open cut trenching but these are no more than local value. A further three 'ordinary' watercourses will either be crossed by HDD (with haul road over) or open cut, and for the purposes of this assessment, open cut has been assumed. These watercourses include a field drain south of Booton Common, and two streams at Salle, one south of Heydon Road and one north of Merriott's Lane.
- 3.11.1.13 Watercourses that are to be crossed by open cut trenching will require pre-construction surveys of the watercourses prior to the commencement of works in order to inform any mitigation strategy required, as described under species-specific impacts.
- 3.11.1.14 Works will be carried out in accordance with relevant legislative requirements and best practice guidelines, as set out in the Outline CoCP (document reference A8.5). Measures will be set in place to minimise the potential for pollution from silt deposition into watercourses and from works vehicles, including measures to prevent transfer of invasive plant or animal species between watercourses.
- 3.11.1.15 Watercourses will be reinstated following each phase of cable installation.
- 3.11.1.16 The impact is predicted to be of local spatial extent, medium term duration, intermittent and moderate reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

- 3.11.1.17 The watercourses affected by open cut are deemed to be of up to medium vulnerability, moderate recoverability and up to district value. The sensitivity of the receptor is, therefore, considered to be medium.

Significance of the effects

- 3.11.1.18 Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for open cut trenching and installation of cables to cause loss of woodland

Magnitude of impact

- 3.11.1.19 The Hornsea Three onshore cable corridor has been routed to avoid and therefore minimise direct impacts on woodland wherever possible. Of the approximately 15.2 ha of woodland (of all types) which occurs within the area affected by Hornsea Three, 14.5 ha, comprising all significant woodland blocks, will be crossed by HDD and will therefore be retained. The remaining area comprises numerous small areas of scattered woodland, or woodland edge, along the length of the Hornsea Three onshore cable corridor, and these would be removed during the construction phase. None of the areas impacted are designated as ancient woodland.
- 3.11.1.20 The impact is predicted to be of local spatial extent, long term duration, continuous and irreversible (woodland will not be replanted over the cables). It is predicted that the impact will affect the receptor directly. Taking into account the limited areas affected (total area of only 0.4 ha comprising very small individual patches), the magnitude is considered to be minor.

Sensitivity of receptor

- 3.11.1.21 Given the disconnected and scattered nature of the woodlands which would be directly impacted by Hornsea Three, they are deemed to be of medium vulnerability, low recoverability and district value. The sensitivity of the receptor is, therefore, considered to be medium.

Significance of the effects

- 3.11.1.22 Overall, it is predicted that the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for open cut trenching and installation of cables to cause loss of arable field margins

Magnitude of impact

- 3.11.1.23 The Hornsea Three onshore cable corridor route runs through some arable land where arable field margins are maintained under a Stewardship agreement (e.g. at Kelling Estate). There will therefore be temporary losses of small areas of this UKBAP habitat, comprising field margins 5-10 m wide, during construction. However, the UKBAP status of the habitat is dependent on the field margins being managed for wildlife and therefore, provided that the landowners continue the management under their stewardship agreements following restoration of the onshore cable corridor, the habitats will be rapidly restored to UKBAP status.
- 3.11.1.24 The impact is predicted to be of local spatial extent, short term duration, intermittent and reversible. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

3.11.1.25 Arable field margins are deemed to be of low vulnerability, high recoverability and district value. The sensitivity of the receptor is, therefore, considered to be low.

Significance of the effects

3.11.1.26 Overall, it is predicted that the sensitivity of the receptor is considered to be low and the magnitude is deemed to be minor. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

Potential for open cut trenching and installation of cables to cause damage to designated sites from airborne pollutants

Magnitude of impact

3.11.1.27 Cable installation could have some impact on sensitive habitats within designated sites in the vicinity of the works area as a result of potential airborne pollutants, primarily dust generation. IAQM guidance suggests that impacts of dust on ecological receptors are unlikely beyond 50 m from the source (IAQM, 2016). Potential air quality impacts, particularly from dust deposition, are therefore most likely to occur on designated sites within 50 m of activities likely to give rise to dust generation, although effective dust control measures will reduce this distance.

3.11.1.28 As set out in chapter 9: Air Quality and Table 3.19, measures will be implemented through the Outline CoCP (document reference A8.5) to control pollutants in order to minimise the potential for, and likely impacts of, airborne pollutants on sensitive habitats within designated sites. The IAQM guidance states that with good dust management and mitigation practices implemented, the residual effects will normally be reduced to a level that is "not significant".

3.11.1.29 The impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be negligible.

Sensitivity of receptor

3.11.1.30 Designated sites within or close to the Hornsea Three onshore cable corridor are listed in Table 3.7. The value of these habitats ranges from county level up to international level for the River Wensum SAC and Norfolk Valley Fens SAC.

3.11.1.31 Designated sites are deemed to be of up to high vulnerability, moderate recoverability and up to international value. The sensitivity of the receptor is, therefore, considered to be very high.

Significance of the effects

3.11.1.32 Overall, the sensitivity of the receptor is considered to be very high and the magnitude is deemed to be negligible. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for open cut trenching and installation of cables to cause damage to habitats from airborne pollutants

Magnitude of impact

3.11.1.33 Cable installation could have some impact on sensitive habitats in the vicinity of the works area as a result of potential airborne pollutants, primarily dust generation. The main potentially sensitive habitats include broadleaved semi-natural woodland, hedgerows, heathland, semi-improved and marshy grassland, ponds and watercourses.

3.11.1.34 As set out in chapter 9: Air Quality, measures will be implemented through the Outline CoCP (document reference A8.5) to control pollutants and limit works areas in order to minimise the potential for and likely impacts of airborne pollutants on sensitive habitats.

3.11.1.35 These will include the establishment of a buffer zone between the works area and adjacent habitats. IAQM guidance suggests that impacts of dust on ecological receptors in the absence of mitigation are unlikely beyond 50 m from the source. However, smaller buffer areas are appropriate where effective dust control measures are in place, as would be the case given the controls set out in the CoCP. The IAQM guidance states that with good dust management and mitigation practises implemented, the residual effects will normally be reduced to a level that is "not significant".

3.11.1.36 The impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be negligible.

Sensitivity of receptor

3.11.1.37 Habitats are deemed to be of up to high vulnerability, moderate recoverability and varying value. The sensitivity of the receptor is, therefore, considered to be high.

Significance of the effects

3.11.1.38 Overall, the sensitivity of the receptor is considered to be high and the magnitude is deemed to be negligible. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for open cut trenching and installation of cables to cause damage to designated sites from runoff of pollutants

Magnitude of impact

3.11.1.39 Open cut trenching and cable installation could have some impact on sensitive habitats within designated sites in the vicinity of the works area as a result of potential runoff of pollutants, particularly silt or other pollutant deposition into ditches and other watercourses that could potentially cause downstream impacts over a wide area.

3.11.1.40 Designated sites considered to be at particular risk of waterborne pollution are:

- Holt Lowes SSSI/Norfolk Valley Fens SAC (River Glaven and tributaries);
- Booton Common SSSI/Norfolk Valley Fens SAC (Blackwater Drain);
- River Wensum SSSI/SAC;
- Land adjoining River Tud CWS (River Tud);
- Low Common CWS and Melton Beck CWS;
- Algarsthorpe Marshes CWS, River Yare at Marlingford CWS, Yare Valley (Bawburgh) CWS; and
- Pasture at Eaton College CWS (River Yare).

3.11.1.41 HDD will be employed on all 'main' and most 'ordinary' watercourses, which include the River Wensum, Tud and Yare, and will avoid the greatest risk to watercourses from runoff pollution. HDD effects are assessed in Section 3.11.1.130.

3.11.1.42 There remains some potential for runoff from trenches to reach watercourses within designated sites. Measures will be adopted to minimise the risk of runoff reaching watercourses to minimise the potential for, and likely impacts of, pollutants on sensitive habitats within designated sites. Further details of pollution control measures are provided in chapter 2: Hydrology and Flood Risk and in the Outline CoCP (document reference A8.5).

3.11.1.43 River Wensum SAC/SSSI: HDD will be employed under this watercourse. The location of the HDD operation has been selected to avoid the risk of runoff from trenching reaching the river. Further details of measures to minimise risk of impacts from runoff are set out in chapter 2: Hydrology and Flood Risk and the Outline CoCP (document reference A8.5).

3.11.1.44 Booton Common SSSI/Norfolk Valley Fens SAC: There is a break of slope on the southern side of the valley within the onshore cable corridor that suggests that groundwater flows within the corridor do not feed directly into the SAC/SSSI but run downslope to the Blackwater Drain. The HDD crossing is upstream of the SAC/SSSI but there are no direct surface water flows from the Hornsea Three onshore cable corridor into the valley fen, except for the Blackwater Drain itself. The Blackwater Drain forms the northern boundary of the Booton Common designated site and it is probable that the drain and the fen are hydraulically linked. A hydrological characterisation report has been prepared (volume 6, annex 2.4: Hydrological Characterisation Study), which outlines the interaction between hydrology and ecology. HDD techniques will be used in this location and mitigation measures to control construction impacts are set out in the Outline CoCP (document reference A8.5).

3.11.1.45 Holt Lowes SSSI/Norfolk Valley Fens SAC: Holt Lowes is approximately 3-4 km downstream along the River Glaven from the onshore cable corridor. The Hornsea Three onshore cable corridor crosses a number of small tributary and headwater streams and ditches that flow into the River Glaven for which HDD will be employed.

3.11.1.46 A detailed crossing method statement setting out the methodology for watercourse crossings will be produced prior to construction, the requirement for which is included in the Outline CoCP (document reference A8.5).

3.11.1.47 The impact is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. Given the control measures proposed, the magnitude is considered to be negligible.

Sensitivity of receptor

3.11.1.48 Designated sites are deemed to be of up to high vulnerability, moderate recoverability and up to international value. The sensitivity of the receptor is, therefore, considered to be up to very high.

Significance of the effects

3.11.1.49 Overall, the sensitivity of the receptor is considered to be very high and the magnitude is deemed to be negligible. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for open cut trenching and installation of cables to cause damage to habitats from runoff of pollutants

Magnitude of impact

3.11.1.50 Cable installation could have some impact on sensitive habitats in the vicinity of the works area as a result of potential runoff of pollutants, particularly silt or other pollutant deposition into ditches and other watercourses that could potentially cause downstream impacts over a wide area.

3.11.1.51 The main potentially sensitive habitats include broadleaved semi-natural woodland, hedgerows, semi-improved and marshy grassland, ponds and watercourses.

3.11.1.52 Measures will be implemented through the Outline CoCP (document reference A8.5) to control pollutants in order to minimise the potential for, and likely impacts of, runoff of pollutants on sensitive habitats.

3.11.1.53 The impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. Given the control measures in place (including the use of HDD for many crossings, together with pollution control measures), the magnitude is considered to be negligible.

Sensitivity of receptor

3.11.1.54 Habitats are deemed to be of up to high vulnerability, moderate recoverability and varying value. The sensitivity of the receptor is, therefore, considered to be high.

Significance of the effects

- 3.11.1.55 Overall, the sensitivity of the receptor is considered to be high and the magnitude is deemed to be negligible. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for open cut trenching and installation of cables leading to habitat loss and/or severance for GCN

Magnitude of impact

- 3.11.1.56 No ponds known to support GCN will be directly affected by the onshore elements of Hornsea Three.
- 3.11.1.57 The onshore cable corridor runs adjacent to ponds with known GCN populations in five places. The majority of the habitat temporarily affected for cable installation is arable land of low potential for terrestrial GCN, but some losses of terrestrial habitat would occur.
- 3.11.1.58 In addition, the onshore cable corridor will run between ponds containing GCN in at least two locations, resulting in a temporary severance effect for the approximate three month duration of the cable installation for each section prior to restoration. The maximum design scenario would include two-phase cable installation, with a gap between phases, and therefore in this scenario there would be two separate severance events, one in each phase.
- 3.11.1.59 Where terrestrial GCN will be affected by cable construction (whether in a one or two phase construction scenario), appropriate mitigation techniques, via a Natural England licence application, will be employed. Mitigation measures are summarised in Table 3.19 and outlined in more detail in the Outline EMP (document reference A8.6), but would include fencing and translocation of GCN from areas of suitable habitat affected by the onshore cable corridor, maintenance of fencing during construction to prevent GCN from entering the construction site, and restoration of habitats after construction. The option of securing a licence via provision of localised habitat enhancements, in line with recent additional options within the licensing system, would also be explored.
- 3.11.1.60 The impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

- 3.11.1.61 GCN are deemed to be of medium vulnerability, high recoverability and district value. The sensitivity of the receptor is, therefore, considered to be medium.

Significance of the effects

- 3.11.1.62 Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for open cut trenching and installation of cables leading to habitat loss and/or severance for reptiles

Magnitude of impact

- 3.11.1.63 Populations of reptiles occur close to or on the onshore cable corridor in nine locations. The majority of the habitat temporarily affected for cable installation is arable land of low potential for reptiles, but some losses of terrestrial habitat would occur.
- 3.11.1.64 In addition, the onshore cable corridor will have a temporary severance effect for the approximate three month duration of the cable installation for each section prior to restoration. In the event that the onshore elements are built out in two phases, this would be repeated for the second phase.
- 3.11.1.65 Where reptiles will be affected by cable construction, appropriate mitigation techniques will be employed. Mitigation measures are outlined in more detail in the Outline EMP (document reference A8.6), but would include fencing and translocation of reptiles from areas of suitable habitat affected by the onshore cable corridor, maintenance of fencing during construction to prevent reptiles from entering the construction site, and restoration of habitats after construction. In the maximum design scenario of a two-phase cable installation, the same measures would be employed at the second phase.
- 3.11.1.66 The impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. Taking into account the control measures proposed, the magnitude is considered to be minor.

Sensitivity of receptor

- 3.11.1.67 Reptiles are deemed to be of medium vulnerability, high recoverability and district value. The sensitivity of the receptor is therefore, considered to be low.

Significance of the effects

- 3.11.1.68 Overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for open cut trenching and installation of cables leading to habitat loss and/or severance for breeding birds

Magnitude of impact

- 3.11.1.69 Where present, Hornsea Three has the potential to impact breeding birds due to habitat loss, predominantly affecting ground-nesting farmland birds in arable or grassland habitats as well as hedgerows. These habitat types comprise almost 90% of the area affected by open cut construction, and approximately 6.68 km of linear hedgerow that will be removed.

- 3.11.1.70 Arable and grassland habitats will be restored after trenching, so the maximum potential impact of the temporary habitat loss would be across two breeding seasons (which could be four to five years apart, depending on the location) if construction is undertaken in two phases. However, given the large amount of arable and grassland habitat within the study area and beyond, it is considered likely that birds would be displaced into adjacent areas and significant reductions in population size are unlikely to occur.
- 3.11.1.71 Impacts on hedgerow nesting birds would be of longer duration given that, even with restoration between phases, the replanted hedgerows may not reach suitable maturity for breeding birds between phases one and two, and therefore the maximum adverse scenario could involve loss of hedgerow habitat suitable for breeding birds for a period that could be approximately nine to ten years (including both phases and a period of establishment after the second phase). As the length of hedgerow loss as a percentage of the available hedgerow resource in the wider study area is small (approximately 1%), it is considered likely that birds would be displaced into adjacent areas and significant reductions in population size would be unlikely to occur.
- 3.11.1.72 In addition to impacts from direct habitat loss, construction activities are likely to deter birds from breeding in the immediate vicinity of the works area. The size of this disturbance impact would vary depending on the species involved, but the maximum duration of this impact would be for two breeding seasons, with a gap between each.
- 3.11.1.73 Pre-construction surveys for nesting birds will be undertaken where construction overlaps with the breeding season, and measures will be set in place to protect active nests until the ECoW has confirmed that young have fully fledged and left the nest. These measures are documented in more detail in the Outline CoCP (document reference A8.5) and Outline EMP (document reference A8.6).
- 3.11.1.74 The impact is predicted to be of district spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. However, the losses of hedgerow and arable habitat comprise a small percentage of the total habitat resource in the wider study area. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

- 3.11.1.75 Breeding birds are deemed to be of medium vulnerability, high recoverability and district value. The sensitivity of the receptor is, therefore, considered to be medium.

Significance of the effects

- 3.11.1.76 Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for open cut trenching and installation of cables to cause habitat loss and disturbance to wintering birds that are designated features of the North Norfolk Coast SPA/Ramsar

Magnitude of impact

- 3.11.1.77 Wintering bird surveys in 2016/2017 and 2017/2018 have found that pink-footed geese use fields within or adjacent to the Hornsea Three onshore cable corridor (volume 6, annex 3.9: Onshore Ornithology – Wintering and Migratory Bird Survey). Details are provided in section 3.7.
- 3.11.1.78 The presence of a significant percentage of the total SPA population of pink-footed geese within the area covered by the wintering bird survey area suggests that the sugar beet fields should be considered as functionally linked habitat associated with the North Norfolk Coast SPA.
- 3.11.1.79 The total area of functionally linked sugar beet fields varies from year to year. Within the approximately 10,750 ha of the 1 km wide survey area encompassing fields with potential to be functionally linked if they are planted with sugar beet, only 77.9 ha were sugar beet fields in the winter of 2016/17 (31.7% of all sugar beet fields used) and 215.4 ha were sugar beet fields in the winter of 2017/18 (62.5% of all sugar beet fields used). These areas are not significant compared to the total sugar beet production along the North Norfolk Coast, e.g. 300 ha of sugar beet were harvested in the winter of 2017/18 from just one farm, Green Farm, Saxlingham, three miles west of Holt (Jones, 2017).
- 3.11.1.80 Whilst there is “a lack of evidence that the feature [pink-footed goose] is being impacted by any anthropogenic activities” (Natural England, 2017b) an increased frequency of disturbance which may reduce the fitness of a significant group of birds at the time of construction cannot be excluded.
- 3.11.1.81 The major determinants for the presence of geese are land use and proximity to the coast. There is therefore the possibility that if the landowners rotate crops so that fields affected by cabling are not used for beet at the time of construction, the birds will not be present. Conversely, any arable fields within the coastal zone not currently used for beet that are planted with beet prior to construction are likely to support pink-footed geese during the winter on at least some occasions. The survey information therefore provides a snapshot of pink-footed goose distribution, but land use and proximity to the coast is likely to enable reasonably accurate predictions of future distribution.
- 3.11.1.82 Direct habitat loss would only occur if fields within the onshore cable corridor are planted with winter beet at the time that cable installation occurs. Given the quantity of beet fields present in the area, it is not considered that any temporary habitat loss for construction will have a direct effect on the geese. The primary potential impact is therefore from disturbance.

- 3.11.1.83 Trenching through beet fields, if present within the onshore cable corridor at the time of construction, will displace birds from the works corridor itself, and is also likely to disturb birds from using adjacent habitat. Pink-footed geese are known to be susceptible to human disturbance and will avoid fields less than 6 ha in size or fields that are close to roads (RSPB 2008; Gill, 1996; Gill *et al* 1996). Mitchell & Hearn (2004) state that most pink-footed geese do not range far from their roost sites, mainly remaining within remaining within 5-10 km, although they may make longer movements to alternative feeding areas in severe weather. JNCC (undated) states that they can occasionally travel over 20 km to reach suitable foraging)
- 3.11.1.84 Madsen (1985) found that the disturbance distance of roads with traffic volume of more than 20 cars per day was approximately up to 500 m, and less if barriers to visual disturbance such as hedgerows were present. Therefore, the distance of the impact zone during construction is considered likely to be in the region of up to 500 m. Although it is noted in volume 6, annex 3.9: Wintering and Migratory Bird Survey that on one occasion during site-specific surveys, birds were not observed to be displaced by a tractor operating in the field they were grazing, the longer-term and more potentially intrusive nature of the cable installation is more likely to result in birds being disturbed.
- 3.11.1.85 Assuming an impact zone of up to 500 m from the onshore cable corridor, and based on the distribution of the birds in 2017/18, the majority of the birds would be outside the impact zone and therefore not disturbed. However, the surveys also suggest that the distribution of birds at any given time appears to be strongly linked to the location of sugar beet fields. Therefore, although it is possible that the birds might habituate to the disturbance caused by construction works to some extent, there remains the potential for disturbance to occur if construction takes place over winter and if winter beet fields are located on or close to the onshore cable corridor.
- 3.11.1.86 Given that the maximum duration over which construction could occur at the onshore cable corridor would be 5.5 years incorporating two phases with a gap between phases of up to three years, the maximum potential impact of disturbance from cable installation could be displacement in two separate years over this period (assuming works close to the coast are carried out over winter in both years).
- 3.11.1.87 The maximum design scenario would involve trenching operations coinciding with the period when the birds may be using fields on or adjacent to the onshore cable corridor. Baseline surveys (see volume 6, annex 3.9: Wintering and Migratory Bird Survey), indicate that the birds use the fields mainly from November to January while they are feeding on the sugar beet tops prior to harvesting. If works were to coincide with this period, and birds were foraging on or adjacent to the onshore cable corridor, there could be regular disturbance of a significant proportion of the SPA population of pink-footed goose, either directly (birds displaced from the onshore cable corridor itself during cable laying operations) or indirectly (from noise or visual disturbance outside the works area up to 500 m from the onshore cable corridor (using effect distances estimated in Madsen (1985)). Disturbed geese would be likely to be displaced to other winter beet fields further from the Hornsea Three onshore cable corridor. It is noted that the presence of birds on or adjacent to the onshore cable corridor would depend upon the landowner crop rotation plans at the time of construction, i.e. if beet was being grown at the locations which would potentially be impacted, and any impacts would be of a relatively short duration.
- 3.11.1.88 The effect of this disturbance would be to potentially increase the energy expenditure of birds, from repeated flushing (should they try to settle on fields within or adjacent to the onshore cable corridor on a regular basis during the winter months), and/or forcing them to fly greater distances to fields outside the disturbed zone. In addition, it is possible that displacing birds from the onshore cable corridor and adjacent fields would result in the displaced birds competing for food with other birds from the SPA elsewhere. Whilst it is difficult to determine whether such additional energy expenditure would result in significant impacts on survival rates during the winter months, there could be some effect on the population in the short term. Madsen (1995) reports that disturbance from farming on pink-footed geese in spring resulted in a reduction in reproductive success compared to birds which were not subject to disturbance, and while this relates to disturbance during the breeding season rather than the wintering season, it demonstrates that disturbance can affect pink-footed geese. Mitchell & Hearn (2004) note that most geese prefer to forage closer to roost sites, and while they are capable of occasionally travelling further when necessary, the possible effect of displacement on the energetics of the wintering geese cannot be ruled out.
- 3.11.1.89 The impact is predicted to be of district spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor indirectly. The magnitude is, therefore, considered to be minor.
- Sensitivity of receptor
- 3.11.1.90 The pink-footed goose population is deemed to be of medium vulnerability, medium recoverability and very high value. The sensitivity of the receptor is, therefore, considered to be high.
- Significance of the effects
- 3.11.1.91 Overall, it is predicted that the sensitivity of the receptor is considered to be high and the magnitude is deemed to be minor. The effect will, therefore, be of **moderate adverse** significance, which is significant in EIA terms. The implications of effects on the features of the North Norfolk Coast SPA/Ramsar site are considered further within the Report to Inform Appropriate Assessment that accompanies this application for Development Consent (document reference A5.2).
- 3.11.1.92 If construction works take place outside November and January inclusive, the Report to Inform Appropriate Assessment (application document reference A5.2) concludes there will be no disturbance impact pathway on pink-footed goose and there will be no adverse effect on pink-footed geese (for see Report to Inform Appropriate Assessment (application document reference A5.2) for further details).
- Further mitigation and residual effects**
- 3.11.1.93 If construction work on functionally linked sugar beet fields is likely to take place between November and January inclusive, a pink-footed goose mitigation plan will be formulated and submitted to Natural England for approval in the 12 months prior to construction. There would be two steps to the plan:
- First, pre-construction surveys and investigations will be undertaken to determine the extent of disturbance likely to occur due to construction activities. This will include a survey of the distribution and abundance of pink-footed geese and the distribution of harvested sugar beet within those

sections of the Hornsea Three onshore cable corridor (and a 500 m disturbance buffer) likely to be affected during the winter season within which works will take place; and

- Second, if required, measures to reduce disturbance or provide alternative foraging habitat will be implemented sufficient to reduce the effects of disturbance to an acceptable level. The measures will be proportionate to the predicted impact at the time of construction and will be effective and agreed with Natural England prior to implementation.

3.11.1.94 Regardless of the above, disturbance of ecological receptors would be minimised through the application of control measures relating to noise in line with the Outline CoCP (document reference A8.5) and EMP (document reference A8.6). Furthermore, where outdoor lighting is required, lighting units will be designed to minimise illumination outside the construction works area, e.g. will be directional, task orientated and where possible, fully shielded. Further details regarding lighting during the construction phase will be developed post consent.

3.11.1.95 Further details of the proposed mitigation strategy are provided in the Report to Inform Appropriate Assessment (document reference A5.2). With further measures in place, it is considered that the residual impact magnitude could be reduced to negligible, and therefore the residual effect could be of **minor adverse** significance, which is not significant in EIA terms.

Potential for open cut trenching and installation of cables to cause habitat loss and disturbance to other wintering birds

Magnitude of impact

3.11.1.96 Wintering bird surveys recorded 83 species within the wintering point count surveys along the onshore cable corridor. Of these species, 46 are considered to be of some conservation value. However, with the exception of pink-footed goose, assessed separately above, none were considered to occur in particularly significant numbers. Species recorded utilising the habitats present on the Hornsea Three onshore cable corridor have wide foraging ranges and, therefore, could be expected to have high adaptability when avoiding the relatively narrow construction areas and adjacent land.

3.11.1.97 Primarily due to the generally low number of wintering and migratory birds recorded during the surveys, the extent of working areas and the availability of alternative suitable habitat in the vicinity, the magnitude of impact of cable installation on wintering and migratory birds from both habitat loss and disturbance will be limited. Furthermore, measures will be implemented, as set out in the Outline COCP (document reference A8.5) to minimise impacts in wintering birds, particularly designing construction lighting to minimise the disturbance impact of light spill during night time works

3.11.1.98 The impact is predicted to be of district spatial extent, long term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

3.11.1.99 Wintering birds are deemed to be of medium vulnerability, moderate recoverability and district value. The sensitivity of the receptor is, therefore, considered to be low.

Significance of the effects

3.11.1.100 Overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for open cut trenching and installation of cables leading to habitat loss and/or severance for bats

Magnitude of impact

3.11.1.101 Where possible, the onshore cable corridor has been selected to avoid impacts on mature trees with known or suspected roosts. One known tree roost, comprising a single soprano pipistrelle recorded on one occasion, is located within the corridor and will need to be removed under Natural England licence if it is found to remain as an active roost when construction occurs. No other known roosts will be affected. The loss of this low status roost will be mitigated via the provision of an alternative roost site on nearby retained trees or woodland (i.e. areas which have been crossed using HDD) within the application boundary. This would be implemented through the CoCP.

3.11.1.102 Bat activity was recorded, via transect and static monitoring surveys, along the length of the onshore cable corridor. As the majority of the land directly affected by cabling is arable, there would be minimal impact on foraging bats as a result of construction. In 37 locations where high or very high levels of bat activity were recorded, the foraging and commuting corridors are proposed to be retained as these are in locations where HDD is proposed. There were eight locations where high or very high activity levels were recorded that will be temporarily severed by the trenching operations. In most cases alternative routes across the onshore cable corridor are available for bats, using hedgerows, woodland edges or river corridors that will be crossed using HDD.

3.11.1.103 The maximum design scenario is a two phase cable installation with a gap between phases. Replanting of hedgerows would be carried out after the first phase but the replanted hedgerows could then need to be removed to allow for the second phase of construction. Following completion of the second phase, there would be a period of a minimum of five years for the new hedgerow planting to mature. Hedgerow severance will impact more on species which are averse to crossing open ground, such as barbastelle and brown long-eared bat.

3.11.1.104 Therefore, artificial hedgerows will be provided in locations where hedgerows supporting high or very high levels of bat activity have been recorded. This will ensure that connectivity will be maintained across gaps created by the removal of hedgerows until the second phase restoration planting matures.

3.11.1.105 Measures outlined within the Outline CoCP (document reference A8.5) will minimise the impact on all bat species, including the commitment to trenching during daylight hours and the use of directional lighting, where lighting is required, to minimise light spillage onto adjacent areas of retained habitat of value to bats. Where practicable, consideration will be given to installing long-lasting woodcrete bat roost boxes in suitable locations on retained mature trees within the Hornsea Three onshore cable corridor to enhance the potential value of the site to roosting bats.

3.11.1.106 The impact is predicted to be of district spatial extent, medium term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

3.11.1.107 Bat populations in the survey area as a whole are deemed to be of medium vulnerability, moderate recoverability and county value. The sensitivity of the receptor is, therefore, considered to be medium.

Significance of the effects

3.11.1.108 Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for open cut trenching and installation of cables leading to habitat loss and/or severance for water voles

Magnitude of impact

3.11.1.109 All surveyed watercourses where water vole signs have been recorded will be crossed using HDD. There will therefore be no direct loss of water vole habitat or habitat fragmentation as a result of Hornsea Three based on current survey information (see volume 6, annex 3.7: Water Vole Survey).

3.11.1.110 Measures adopted to minimise the impact of works on water voles are set out within the Outline EMP (document reference A8.6) and include: pre-construction surveys to identify any new signs of water vole activity; the use of 10 m and 50 m buffer zones where practicable between watercourses supporting water voles and open cut installation works or the location of HDD installation launch pits (respectively); measures to minimise the potential impacts of pollutants on watercourses; and directional lighting so as to minimise the disturbance impact of light spill during night time works (if required).

3.11.1.111 In addition, works will be carried out under the guidance of an ECoW.

3.11.1.112 The impact is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be negligible.

Sensitivity of receptor

3.11.1.113 Water vole populations in the survey area as a whole are deemed to be of medium vulnerability, moderate recoverability and district value. The sensitivity of the receptor is, therefore, considered to be medium.

Significance of the effects

3.11.1.114 Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

Potential for open cut trenching and installation of cables leading to habitat loss and/or severance for otters

Magnitude of impact

3.11.1.115 All watercourses where otter signs have been recorded are proposed to be crossed using HDD. There will therefore be no direct loss of otter habitat or habitat fragmentation as a result of the cable installation. No holts have been identified that are sufficiently close to the onshore cable corridor for a risk of damage to occur.

3.11.1.116 Measures adopted as part of the project to minimise disturbance to otters include pre-construction surveys to confirm locations of otter activity, holts or resting places, the covering of deep excavations, and measures to minimise the potential impacts of pollutants on watercourses. Construction lighting will be directional so as to minimise the disturbance impact of light spill during night time works.

3.11.1.117 The impact is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be negligible.

Sensitivity of receptor

3.11.1.118 Otter populations in the survey area as a whole are deemed to be of medium vulnerability, moderate recoverability and county value. The sensitivity of the receptor is, therefore, considered to be medium.

Significance of the effects

3.11.1.119 Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

Potential for open cut trenching and installation of cables to cause habitat loss and disturbance to badgers

Magnitude of impact

3.11.1.120 Badger surveys undertaken for the onshore elements of Hornsea Three, including compounds, storage areas and access, have identified five badger setts within or adjacent to the Hornsea Three onshore cable corridor which may be affected by cabling works. Details are provided in the confidential Appendix A to the Outline EMP (document reference A8.6) as well as volume 6, annex 3.12: Badger Survey.

3.11.1.121 In summary, these comprise:

- One outlier sett, which is within an area of HDD and may therefore need to be closed given that HDD operations may damage the below ground sett chambers;
- One outlier sett, which is on the edge of the area affected by an area of HDD, and which may need to be closed;
- One currently disused outlier sett, in an area of HDD which may need closing if found to be occupied during pre-construction surveys;
- One partially used subsidiary sett approximately 30 m from the onshore cable corridor, which should be unaffected by Hornsea Three; and
- Two outlier setts on the edge of an HDD area, which may need to be closed.

3.11.1.122 None of the setts currently known that may be affected are main setts.

3.11.1.123 Sett closures, where this is necessary to safeguard badgers from trenching operations, would be carried out under licence from Natural England.

3.11.1.124 Pre-construction badger surveys of potentially suitable habitat and a surrounding buffer zone of at least 30 m in width will be undertaken in advance of each phase of onshore cable corridor works in order to locate any new active badger setts and areas of high badger activity. Should an active sett or high levels of badger activity be recorded, a suitably experienced ecologist will assess the likely impacts of the works on the sett or badgers in the area. A Natural England development licence for badgers may be required for works to continue if it is not practicable to establish a 30 m works-free buffer zone between an active sett and the cable trench, or if works are likely to cause significant disturbance to badgers.

3.11.1.125 Should findings of pre-construction surveys confirm high levels of badger activity, where considered necessary by the ECoW to ensure the safety of badgers, badger exclusion fencing will be installed around working areas.

3.11.1.126 Measures outlined within the Outline CoCP (document reference A8.5) will minimise the impact on badgers, including the use of directional lighting, where lighting is required, to minimise light spillage onto adjacent areas during night time works.

3.11.1.127 The impact is predicted to be of local spatial extent, medium term duration, continuous for sett closures and intermittent for disturbance impacts, and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

3.11.1.128 Badger populations in the survey area as a whole are deemed to be of low vulnerability, moderate recoverability and district value. The sensitivity of the receptor is, therefore, considered to be low.

Significance of the effects

3.11.1.129 Overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for HDD beneath watercourses to cause damage and disturbance to designated sites

Magnitude of impact

3.11.1.130 Hydrological characterisation has been undertaken following consultation with the Onshore EWG (volume 6, annex 2.4: Hydrological Characterisation Study) and a summary is provided in chapter 2: Hydrology and Flood Risk.

3.11.1.131 HDD will be undertaken for the following watercourses that are or are close to designated sites:

- River Glaven tributaries - Holt Lowes SSSI/Norfolk Valley Fens SAC;
- Blackwater Drain - Booton Common SSSI/Norfolk Valley Fens SAC;
- River Wensum SSSI/SAC;
- River Tud - Land Adjacent to River Tud CWS;
- River Yare – River Yare at Martlingford CWS and Algarsthorpe Meadows CWS;
- Melton Beck – Low Common CWS and Melton Beck CWS; and
- Stream at Foxburrow Meadows CWS.

3.11.1.132 The locations of HDD launch pits have been selected based on site visits to identify appropriate locations for the works that are outside sensitive habitats.

3.11.1.133 HDD has been proposed as part of the designed-in mitigation in order to avoid land take and disturbance to designated sites. Nevertheless, some limited effects may arise from HDD operations. The maximum design scenario involves a two-phase cable installation with a gap between phases, so would involve two HDD operations under each watercourse.

3.11.1.134 Activities involving the use of HDD and associated machinery during the construction phase have the potential to lead to an increase in turbid runoff and spillages/leaks of fuel, oil etc., which could affect nearby watercourses. Similarly, the Hornsea Three onshore cable corridor itself could act as a drainage channel, leading to runoff from construction affecting nearby watercourses. However, the Outline CoCP (document reference A8.5) includes measures to intercept runoff and ensure that discharges from the site are controlled in quality and volume. This may include the use of settling tanks or ponds to remove sediment, temporary interceptors and a hydraulic brake.

3.11.1.135 Any pollutant impact of cable pulling may result from the potential need to re-open sealed jointing pits, construct new areas of temporary hardstanding for HGVs and any vehicle spillage and leakages.

3.11.1.136 Measures are proposed to control potential pollutants and light spill, in order to limit the potential for and likely extent of such impacts. This includes a protocol for handling bentonite should a breakout occur. These measures will be implemented through the CoCP. Taken together these measures are considered to reduce risk of, and impact from, HDD to negligible levels.

3.11.1.137 The impact is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be negligible.

Sensitivity of receptor

3.11.1.138 The watercourses crossed via HDD are considered to be moderately vulnerable, but of moderate to high recoverability. The value of the watercourses is determined partly by the designated site status of the watercourse itself or designated sites that are hydrologically linked and close to the HDD locations.

3.11.1.139 The watercourses are deemed to be of medium vulnerability, medium to high recoverability and high value. The maximum sensitivity of the receptors is, therefore, considered to be high.

Significance of the effects

3.11.1.140 Overall, the sensitivity of the receptor is considered to be high and the magnitude is deemed to be negligible. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for HDD beneath watercourses to cause damage and disturbance to other watercourses and habitats

Magnitude of impact

3.11.1.141 Hydrological characterisation has been undertaken, comprising a desk study and site walkover to identify the hydrological and ecological features in these locations and how they interact. Potential constraints were mapped and have been used to inform the design of the crossing methodologies in these areas. The hydrological characterisation work has been undertaken following consultation with the Onshore EWG and is provided in volume 6, annex 2.4: Hydrological Characterisation Study and as a summary in chapter 2: Hydrology and Flood Risk.

3.11.1.142 In addition to the HDD under designated sites assessed above, HDD is also proposed for all 'main' and numerous 'ordinary' watercourses, including:

- River Bure;
- Swannington Beck; and
- Intwood Stream.

3.11.1.143 The locations of the HDD launch pits have been selected based on site visits to identify appropriate locations for the works that are outside sensitive habitats.

3.11.1.144 HDD has been proposed as part of the designed-in mitigation in order to avoid potential effects on watercourses associated with open trenching. Nevertheless, some limited effects may arise from HDD operations. Activities involving the use of HDD and associated machinery during the construction phase could lead to an increase in turbid runoff and spillages/leaks of fuel, oil etc., which could affect nearby watercourses. Similarly, the Hornsea Three onshore cable corridor itself could act as a drainage channel, leading to runoff from construction affecting nearby watercourses. However, the construction process will include measures to intercept runoff and ensure that discharges from the site are controlled in quality and volume. This may include the use of settling tanks or ponds to remove sediment, temporary interceptors and a hydraulic brake.

3.11.1.145 Any pollutant impact of cable pulling may result from the potential need to re-open sealed jointing pits, construct new areas of temporary hardstanding for HGVs and any vehicle spillage and leakages.

3.11.1.146 Measures are proposed to control potential pollutants and light spill, in order to limit the potential for, and likely extent of such impacts. This includes a protocol for handling bentonite. These measures will be implemented through the CoCP. Taken together these measures are considered to reduce risk of, and impact from, HDD to negligible levels.

3.11.1.147 The maximum design scenario involves a two-phase cable installation with a gap between phases, so would involve two HDD operations under each watercourse.

3.11.1.148 The impact is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be negligible.

Sensitivity of receptor

3.11.1.149 The watercourses and associated habitats are deemed to be of medium vulnerability, medium to high recoverability and district value. The maximum sensitivity of the receptors is, therefore, considered to be medium.

Significance of the effects

3.11.1.150 Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be negligible. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for HDD to cause disturbance to breeding birds

Magnitude of impact

- 3.11.1.151 HDD has been proposed during the design process in order to reduce disturbance to species, including breeding birds. Nevertheless, some limited disturbance may arise from HDD operations. Construction lighting will be directional so as to minimise the disturbance impact of light spill during night time works if required. Standard best practice construction methods would minimise impacts from noise and visual disturbance but some residual impact of disturbance on breeding birds is likely.
- 3.11.1.152 An Outline CoCP (document reference A8.5) is provided as part of the application for development consent. Detailed methodologies will be produced prior to construction, informed by re-surveys where necessary.
- 3.11.1.153 Where HDD operations take place during the breeding season, pre-construction surveys for nesting birds will be undertaken of HDD launch and exit pits and associated works areas and a surrounding 20 m buffer. If required, measures will be put in place to protect active nests until the ECoW has confirmed that young have fully fledged and left the nest.
- 3.11.1.154 The maximum design scenario involves a two-phase cable installation with a gap between phases, so would involve two HDD operations under each feature. HDD works in each location would take place for no more than one month (per phase), so the effect is limited in temporal extent in any one location where HDD is proposed.
- 3.11.1.155 The impact is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

- 3.11.1.156 Breeding birds are deemed to be of medium vulnerability, high recoverability and district value. The sensitivity of the receptors is therefore considered to be medium.

Significance of the effects

Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for HDD to cause disturbance to bats

Magnitude of impact

- 3.11.1.157 HDD has been proposed as part of the designed-in mitigation in order to avoid or reduce effects associated with open trenching. Nevertheless, given that bat activity occurs close to the majority of locations where HDD will be undertaken, some limited disturbance impacts to bats may arise.

- 3.11.1.158 Measures adopted as part of Hornsea Three, including the use of directional lighting, would minimise the level of disturbance from light spillage on foraging and potentially roosting bats. These measures are set out in the Outline CoCP (document reference A8.5) which is provided as part of the application. Detailed crossing method statements will be produced prior to construction, informed by the site-specific surveys carried out in 2017, as well as pre-construction surveys of trees with high roost potential where these are located within 50 m of light sources (where necessary).

- 3.11.1.159 The maximum design scenario involves a two-phase cable installation with a gap between phases, so would involve two HDD operations at each crossing. HDD works in each location would take place for no more than one month (per phase), so the effect is limited in temporal extent in any one location where HDD is proposed.

- 3.11.1.160 The impact is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

- 3.11.1.161 Foraging and commuting bats are deemed to be of medium vulnerability, medium recoverability and county value. The sensitivity of the receptors is therefore considered to be medium.

Significance of the effects

- 3.11.1.162 Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for HDD to cause disturbance to water voles

Magnitude of impact

- 3.11.1.163 Water voles are present in some watercourses crossed by HDD.
- 3.11.1.164 HDD has been proposed as part of the designed-in mitigation in order to avoid or reduce potential effects associated with open trenching. Nevertheless, some limited effects may arise from HDD operations. HDD under watercourses where water voles are present is not likely to cause direct loss of water vole habitat. Disturbance impacts would be minimised via use of directional lighting to minimise light spillage.
- 3.11.1.165 Measures adopted to minimise the impact of works on water voles include: pre-construction surveys to locate new signs of water vole activity; where practicable the use of 10 m and 50 m buffer zones between watercourses supporting water voles and the location of HDD installation launch pits; measures to minimise the potential impacts of pollutants on watercourses; and directional lighting to minimise the disturbance impact of light spill during night time works (if required).

3.11.1.166 In addition, works will be carried out under the guidance of an ECoW. An Outline CoCP (document reference A8.5) is provided as part of the application for development consent. Detailed methodologies will be produced prior to construction, informed by surveys carried out in 2017 and re-surveys where necessary.

3.11.1.167 The maximum design scenario involves a two-phase cable installation with a gap between phases, so would involve two HDD operations under each watercourse. HDD works in each location would take place for no more than one month (per phase), so the effect is limited in temporal extent in any one location where HDD is proposed.

3.11.1.168 The impact is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

3.11.1.169 Water voles are deemed to be of medium vulnerability, medium recoverability and district value. The sensitivity of the receptors is therefore considered to be medium.

Significance of the effects

3.11.1.170 Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for HDD to cause disturbance to otters

Magnitude of impact

3.11.1.171 HDD has been proposed as part of the designed-in mitigation in order to avoid or reduce potential effects associated with open trenching. Nevertheless, some limited effects may arise from HDD operations. Measures adopted as part of the project to minimise the impact of works on otters include pre-construction surveys to locate signs of otter activity, holts or resting places, the covering of deep excavations, and measures to minimise the potential impacts of pollutants on watercourses. Construction lighting will be directional so as to minimise the disturbance impact of light spill during night time works.

3.11.1.172 Works will be carried out under the guidance of an ECoW.

3.11.1.173 The maximum design scenario involves two-phase cable installation with a gap between phases, so would involve two HDD operations under each watercourse. HDD works in each location would take place for no more than one month (per phase), so the effect is limited in temporal extent in any one location where HDD is proposed.

3.11.1.174 The impact is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

3.11.1.175 Otters are deemed to be of medium vulnerability, medium recoverability and county value. The sensitivity of the receptors is therefore considered to be medium.

Significance of the effects

3.11.1.176 Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for permanent habitat loss from construction of the HVAC booster station and HVDC converter/HVAC substation to have adverse impacts on habitats

Magnitude of impact

3.11.1.177 Habitats present in the permanent onshore HVDC converter/HVAC substation area and the permanent HVAC booster station area and associated temporary works area are arable fields and species-rich and species-poor hedgerows, some of which contain standard trees. The arable land is of no significant conservation interest.

3.11.1.178 Approximately 500 m of hedgerow lies within the permanent works area for the onshore HVDC converter/HVAC substation, all of which are on the boundaries. No hedgerows will be removed within the permanent works area for the HVAC booster station.

3.11.1.179 Hedgerows on the boundary of the works areas would be retained wherever practicable. Hedgerows within the works area will need to be removed. Hedgerows on the boundary between the permanent land take and associated temporary works areas may also need to be removed during construction.

3.11.1.180 Measures adopted as part of Hornsea Three, including the creation of works-free buffer zones and measures to control potential pollutants (airborne and runoff), will limit the impact of works on nearby retained hedgerows and adjacent woodland.

3.11.1.181 Landscaping design associated with the onshore HVDC converter/HVAC substation would provide replacement hedgerows if any of the existing boundary hedges are removed for construction.

3.11.1.182 The impact is predicted to be of local spatial extent, medium term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

3.11.1.183 The receptor is deemed to be of medium vulnerability, medium recoverability and district value. The sensitivity of the receptor is, therefore, considered to be low.

Significance of the effects

3.11.1.184 Overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for construction of the HVAC booster station and HVDC converter/HVAC substation to have adverse impacts on designated sites from airborne pollutants

Magnitude of impact

3.11.1.185 The air quality assessment has noted that the onshore elements of Hornsea three are within close proximity to ecological sites and has classified the surrounding area as highly sensitive regarding the impact on ecological receptors.

3.11.1.186 The onshore HVAC booster station area is immediately adjacent to the New Covert CWS. This site comprises broadleaved semi-natural woodland and could be affected by airborne pollutants during construction. No other designated sites are close enough to onshore infrastructure to be affected by airborne pollutants.

3.11.1.187 Measures will be implemented through the CoCP to control pollutants and limit works areas in order to minimise the potential for and likely impacts of airborne pollutants on sensitive habitats.

3.11.1.188 The footprint of the onshore HVAC booster station itself will be approximately 22 m from the CWS. However, the permanent access road will run south from the onshore HVAC booster station along an existing farm track adjacent to the CWS and then east along the southern boundary of the CWS. Construction of the access road will therefore involve working in close proximity to the CWS, with the potential for impacts from dust generation to occur along the fringe of the CWS. The mitigation measures set out in chapter 9: Air Quality and the Outline CoCP (document reference A8.5) have been developed in order to minimise these impacts. The IAQM guidance states that with good dust management and mitigation practises implemented, the residual effects will normally be reduced to a level that is "not significant".

3.11.1.189 The impact is predicted to be of local spatial extent, medium term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be negligible.

Sensitivity of receptor

3.11.1.190 New Covert CWS is deemed to be of medium vulnerability, moderate recoverability and county value. The sensitivity of the receptor is, therefore, considered to be medium.

Significance of the effects

3.11.1.191 Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

Potential for construction of the HVAC booster station and HVDC converter/HVAC substation to cause damage to designated sites from runoff of pollutants

Magnitude of impact

3.11.1.192 The onshore HVAC booster station area is immediately adjacent to the New Covert CWS. This site comprises broadleaved semi-natural woodland and could be affected by runoff of pollutants during construction.

3.11.1.193 The Outline CoCP (document reference A8.5) contains measures to minimise risk of runoff pollutants reaching adjacent habitats and to limit works areas in order to minimise the potential for, and likely impacts of, runoff of pollutants on sensitive habitats within designated sites.

3.11.1.194 The footprint of the onshore HVAC booster station itself will be constructed approximately 22 m from the CWS. However, the permanent access road will run south from the onshore HVAC booster station along an existing farm track adjacent to the CWS and then east along the southern boundary of the CWS. Construction of the access road will therefore involve working in close proximity to the CWS, with the potential for impacts from surface water runoff to occur along the fringe of the CWS. The mitigation measures set out in chapter 2: Hydrology and Flood Risk and the Outline CoCP (document reference A8.5) have been developed in order to minimise these impacts. Furthermore, where access road works are proposed within the root protection zone associated with the established trees which form part of the CWS, Hornsea Three will explore the opportunities to deploy a 'no-dig system' and if needed making use of expandable cellular confinement systems which spread the loads and reduce risk to damage to tree roots below.

3.11.1.195 The impact is predicted to be of local spatial extent, short term duration, continuous and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be negligible.

Sensitivity of receptor

3.11.1.196 New Covert CWS is deemed to be of medium vulnerability, moderate recoverability and county value. The sensitivity of the receptor is, therefore, considered to be medium.

Significance of the effects

3.11.1.197 Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

Potential for construction of the HVAC booster station and HVDC converter/HVAC substation to have adverse impacts on habitats from airborne pollutants

Magnitude of impact

- 3.11.1.198 Construction of the onshore HVDC converter/HVAC substation and HVAC booster station could have adverse effects on adjacent habitats, particularly hedgerows and woodland from airborne pollutants (including dust generation) during construction.
- 3.11.1.199 The Outline CoCP (document reference A8.5) includes measures to control pollutants and limit works areas in order to minimise the potential for and likely impacts of airborne pollutants on sensitive habitats.
- 3.11.1.200 Where construction will occur in close proximity to the CWS, e.g. for the permanent access road which will run south from the onshore HVAC booster station along an existing farm track adjacent to the CWS and then east along the southern boundary of the CWS, the mitigation measures set out in, chapter 9: Air Quality and the Outline CoCP (document reference A8.5) will be implemented. The IAQM guidance states that with good dust management and mitigation practises implemented, the residual effects will normally be reduced to a level that is "not significant".
- 3.11.1.201 The impact is predicted to be of local spatial extent, medium term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be negligible.

Sensitivity of receptor

- 3.11.1.202 Habitats in the vicinity of the onshore HVDC converter/HVAC substation and HVAC booster station construction sites are deemed to be of medium vulnerability, moderate recoverability and district value. The sensitivity of the receptor is, therefore, considered to be low.

Significance of the effects

- 3.11.1.203 Overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be minor. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

Potential for construction of the HVAC booster station and HVDC converter/HVAC substation to cause damage to habitats from runoff of pollutants

Magnitude of impact

- 3.11.1.204 Construction of the onshore HVDC converter/HVAC substation and HVAC booster station could have adverse effects on adjacent habitats, particularly hedgerows and woodland from runoff of pollutants during construction.

- 3.11.1.205 Where construction will occur in close proximity to the CWS, e.g. for the permanent access road, the Outline CoCP (document reference A8.5) includes measures to minimise the risk of runoff pollutants reaching adjacent habitats and to limit works areas in order to minimise the potential for and likely impacts of runoff pollutants on sensitive habitats. Further details of the measures proposed to control runoff are provided in chapter 2: Hydrology and Flood Risk.

- 3.11.1.206 The impact is predicted to be of local spatial extent, medium term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

- 3.11.1.207 Habitats in the vicinity of the onshore HVDC converter/HVAC substation and HVAC booster station construction sites are deemed to be of medium vulnerability, moderate recoverability and district value. The sensitivity of the receptor is, therefore, considered to be low.

Significance of the effects

- 3.11.1.208 Overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for permanent habitat loss from construction of the HVAC booster station and HVDC converter/HVAC substation to have adverse impacts on breeding birds

Magnitude of impact

- 3.11.1.209 Permanent land take for construction of the onshore HVDC converter/HVAC substation and HVAC booster station will result in loss of arable and hedgerow habitat, which will reduce available habitat for farmland birds. However, the extent of permanent habitat loss will be relatively small, and additional planting for screening will be undertaken that will provide replacement hedgerow, tree and meadow planting which will mitigate for the majority of permanent habitat losses.

- 3.11.1.210 Given the significant amount of arable and hedgerow habitat in the surrounding area, it is not expected that species would experience significant reductions in breeding populations.

- 3.11.1.211 The impact is predicted to be of local spatial extent, long term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. Taking into account the small area affected, the magnitude is considered to be minor.

Sensitivity of receptor

- 3.11.1.212 Breeding birds in the areas affected by permanent works are considered to be of medium vulnerability, high recoverability and district value. The sensitivity of the receptor is, therefore, considered to be medium.

Significance of the effects

3.11.1.213 Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for permanent habitat loss from construction of the HVAC booster station and HVDC converter/HVAC substation to have adverse impacts on wintering birds

Magnitude of impact

3.11.1.214 Fifty one species of bird were recorded within the HVAC booster station survey area and associated temporary works area plus 100 m survey buffer zone during wintering bird surveys, of which 24 had some conservation value. Most species were recorded in low numbers, the exception being a count of 1,325 pink-footed geese in November 2016, counts of 1,031 and 372 black-headed gulls in November and December 2016, a count of 606 starlings in November 2016 and a count of 81 lapwing in January 2017.

3.11.1.215 Forty one species of bird were recorded within the onshore HVDC converter/HVAC substation area and associated temporary works area plus 100 m survey buffer zone during wintering bird surveys, of which 17 had some conservation value. Most species were recorded in low numbers, with the highest count being 71 lapwing in November 2017.

3.11.1.216 Wintering wader species recorded using inland habitats have wide foraging ranges and, therefore, could be expected to have high adaptability when avoiding the relatively limited construction areas. The count of pink-footed geese within the onshore HVAC booster station area is unusual in that the vast majority of the records for this species were obtained from the coastal strip. This species uses beet fields and therefore is primarily affected by land use in terms of distribution.

3.11.1.217 It is considered that the extent of permanent habitat loss (approximately 18 ha in total) for the onshore HVDC converter/HVAC substation and HVAC booster station, plus approximately 6 ha for landscape screening is of minor concern for wintering birds given the large amount of similar habitat in the wider countryside.

3.11.1.218 Construction lighting will be directional so as to minimise the disturbance impact of light spill during night time works.

3.11.1.219 The impact of permanent habitat loss is predicted to be of local spatial extent, long term duration (continuous) and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

3.11.1.220 The receptor is deemed to be of medium vulnerability, moderate recoverability and district value. The sensitivity of the receptor is, therefore, considered to be low.

Significance of the effects

3.11.1.221 Overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for permanent habitat loss from construction of the HVAC booster station and HVDC converter/HVAC substation to have adverse impacts on bats

Magnitude of impact

3.11.1.222 Permanent land take for construction of the onshore HVDC converter/HVAC substation and HVAC booster station will result in loss of arable and hedgerow habitat. The arable habitat is of minimal value for bats, but hedgerows are utilised for commuting and foraging.

3.11.1.223 Bat activity surveys at the HVAC booster station site found high levels of activity along the edge of New Covert CWS, and low levels of activity on other hedgerows in the vicinity of the permanent land take area. The CWS itself will not be directly affected, and therefore foraging in this location should be maintained. While loss of some internal hedgerows will reduce foraging habitat, bat activity levels in these hedgerows are lower, and alternative routes around the permanent land take will not be affected.

3.11.1.224 Bat activity surveys of the onshore HVDC converter/HVAC substation site found high levels of activity along the northern boundary and in one other location on the boundary of the permanent infrastructure. The northern boundary will be retained, and alternative routes for bats will remain around the perimeter of the permanent land take area. In addition, planting will be undertaken to provide visual screening at both the HVAC booster station, HVDC converter/HVAC substation (see Outline Landscape Management Plan which accompanies the application), comprising hedgerow, trees and meadow creation, which will provide additional foraging and commuting habitat for bats once it has matured.

3.11.1.225 Therefore, while there will be a limited reduction in foraging and commuting habitat in the short-medium term, overall the ability of bats to forage and disperse through the landscape should not be significantly affected.

3.11.1.226 The impact is predicted to be of local spatial extent, medium term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

3.11.1.227 Bats are considered to be of medium vulnerability, moderate recoverability and county value. The sensitivity of the receptor is, therefore, considered to be medium.

Significance of the effects

3.11.1.228 Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for temporary habitat loss from construction of construction compounds and storage areas to have adverse impacts on habitats

Magnitude of impact

- 3.11.1.229 Habitats present in temporary construction compounds and storage areas are predominantly arable land (approximately 62%), with some improved and poor semi-improved grassland. These habitats are not considered to be of significant conservation interest.
- 3.11.1.230 In addition, some areas of hedgerow occur within areas selected for temporary compounds associated with the onshore HVDC converter/HVAC substation and the HVAC booster station. Hedgerows on the boundary of the compounds would be retained wherever practicable. Any hedgerows removed within the compounds would be restored following completion of construction.
- 3.11.1.231 Measures set out in the Outline CoCP (document reference A8.5), including the creation of works-free buffer zones and measures to control potential pollutants (airborne and runoff) will limit the impact of works on nearby retained hedgerows and adjacent woodland.
- 3.11.1.232 Furthermore, restoration of the compounds and storage areas would take place following construction. On this basis, the impact is predicted to be of local spatial extent, medium term duration, continuous and high reversibility. It is predicted that the impact will affect the receptors directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

- 3.11.1.233 The receptor is deemed to be of medium vulnerability, medium recoverability and district value. The sensitivity of the receptor is, therefore, considered to be low.

Significance of the effects

- 3.11.1.234 Overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for construction and use of temporary construction compounds to have adverse impacts on designated sites from airborne pollutants

Magnitude of impact

- 3.11.1.235 The landfall compound, main construction compound and the onshore HVDC converter/HVAC substation compound are not close enough to any designated sites for these compound to affect designated sites. However, the onshore HVAC booster station and construction compound are immediately adjacent to the New Covert CWS. This site comprises broadleaved semi-natural woodland and could be affected by airborne pollutants during construction. There are also numerous secondary compounds and storage areas along the onshore cable route, some of which are located close to designated sites. Dust generation from soil storage in these locations could therefore affect designated sites.

- 3.11.1.236 Measures set out in the Outline CoCP (document reference A8.5) and in chapter 9: Air Quality to control pollutants will minimise the potential for, and likely impacts of, airborne pollutants, particularly dust on sensitive sites and habitats. The IAQM guidance states that with good dust management and mitigation practises implemented, the residual effects will normally be reduced to a level that is "not significant".

- 3.11.1.237 The impact is predicted to be of local spatial extent, medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. Given the location and measures proposed, the magnitude is considered to be negligible.

Sensitivity of receptor

- 3.11.1.238 The designated sites which are in proximity to temporary construction compounds are of medium vulnerability, moderate recoverability and up to national value. The sensitivity of the receptor is therefore considered to be up to high.

Significance of the effects

- 3.11.1.239 Overall, the sensitivity of the receptor is considered to be up to high and the magnitude is deemed to be negligible. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for construction of temporary compounds and storage areas to cause damage to designated sites from runoff of pollutants

Magnitude of impact

- 3.11.1.240 The landfall compound, main construction compound and the onshore HVDC converter/HVAC substation compound are not located close enough to any designated sites to have an impact. However, the onshore HVAC booster station and construction compound are immediately adjacent to the New Covert CWS. Furthermore, there are numerous secondary compounds and storage areas along the onshore cable route (many associated with proposed crossing locations), some of which are located close to designated sites. Runoff of pollutants from these sites could therefore affect designated sites.
- 3.11.1.241 Hydrological characterisation of the proposed crossing locations of main rivers and other watercourses has been undertaken, comprising a desk study and site walkover to identify the hydrological and ecological features in these locations and how they interact. Potential constraints were mapped and have been used to inform the design of the crossing methodologies and location of compounds in these areas (volume 6, annex 2.4: Hydrological Characterisation Study). Measures set out in the Outline CoCP (document reference A8.5) and chapter 2: Hydrology and Flood Risk will be implemented to minimise risk of runoff of pollutants reaching adjacent designated sites and to limit works areas in order to minimise the potential for, and likely impacts of, runoff pollutants on sensitive habitats within designated sites.
- 3.11.1.242 The impact is predicted to be of local spatial extent, medium term duration, continuous and medium reversibility. It is predicted that the impact will affect the receptor directly. Taking into account the pollution control measures proposed, the magnitude is considered to be negligible.

Sensitivity of receptor

3.11.1.243 The designated sites that are in proximity to temporary construction compounds are of medium vulnerability, moderate recoverability and up to national value. The sensitivity of the receptor is therefore considered to be up to high.

Significance of the effects

3.11.1.244 Overall, the sensitivity of the receptor is considered to be up to high and the magnitude is deemed to be negligible. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for construction of construction compounds and storage areas to have adverse impacts on habitats from airborne pollutants

Magnitude of impact

3.11.1.245 Construction and use of temporary compounds could have adverse effects on adjacent habitats, particularly hedgerows and woodland from airborne pollutants during construction.

3.11.1.246 Measures will be implemented as set out in the Outline CoCP (document reference A8.5) and chapter 9: Air Quality to control pollutants and limit works areas in order to minimise the potential for, and likely impacts of, airborne pollutants on sensitive habitats. These will include establishment of a buffer zone between the works area and adjacent sensitive habitats, where considered appropriate. The IAQM guidance states that with good dust management and mitigation practises implemented, the residual effects will normally be reduced to a level that is "not significant".

3.11.1.247 The impact is predicted to be of local spatial extent, medium term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. Taking into account the proposed dust control measures, the magnitude is considered to be negligible.

Sensitivity of receptor

3.11.1.248 Habitats in the vicinity of the temporary compounds and storage areas are deemed to be of medium vulnerability, moderate recoverability and district value. The sensitivity of the receptor is, therefore, considered to be low.

Significance of the effects

3.11.1.249 Overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

Potential for construction of temporary compounds to cause damage to habitats from runoff of pollutants

Magnitude of impact

3.11.1.250 Construction and use of temporary compounds could have adverse effects on adjacent habitats, particularly hedgerows and woodland from runoff of pollutants during construction.

3.11.1.251 Measures will be implemented as set out in the Outline CoCP (document reference A8.5) and chapter 2: Hydrology and Flood Risk to minimise risk of runoff of pollutants reaching adjacent habitats and to limit works areas in order to minimise the potential for and likely impacts of runoff pollutants on sensitive habitats.

3.11.1.252 The impact is predicted to be of local spatial extent, medium term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. Taking into account the pollution control measures proposed, the magnitude is considered to be negligible.

Sensitivity of receptor

3.11.1.253 Habitats in the vicinity of the temporary compounds and storage areas are deemed to be of medium vulnerability, moderate recoverability and district value. The sensitivity of the receptor is, therefore, considered to be low.

Significance of the effects

3.11.1.254 Overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

Potential for temporary habitat loss from construction and use of construction compounds and storage areas to have adverse impacts on wintering birds

Magnitude of impact

3.11.1.255 Temporary construction compounds are predominantly located on arable land and grassland. The storage areas and HDD compounds, while numerous, are small in size and distributed along the cable route such that there would be minimal impact from temporary habitat loss or disturbance to wintering birds.

3.11.1.256 The HVAC booster station, survey area and associated temporary works area plus 100 m survey buffer zone during wintering bird surveys, of which 24 had some conservation value. Most species were recorded in low numbers, the exception being a count of 1,325 pink-footed geese in November 2016, counts of 1,031 and 372 black-headed gulls in November and December 2016, a count of 606 starlings in November 2016 and a count of 81 lapwings in January 2017.

3.11.1.257 Forty one species of bird were recorded within the onshore HVDC converter/HVAC substation compounds and the main construction compound. These areas are larger in size and would be in use for a longer period, but again these temporary losses of foraging habitat are unlikely to significantly affect wintering birds in the wider area.

3.11.1.258 Most wintering species were recorded in low numbers, the main exception being a count of 1,325 pink-footed geese in November 2016 in the HVAC booster station survey area. Wintering wader species recorded using inland habitats have wide foraging ranges and, therefore, could be expected to have high adaptability when avoiding the relatively limited construction areas. The count of pink-footed geese within the HVAC booster station area is unusual in that the majority of the records for this species were obtained from the coastal strip. This species uses beet fields and therefore is primarily affected by land use in terms of distribution. Pink-footed geese have not been recorded using fields on or close to the landfall construction compound.

3.11.1.259 A total of approximately 31 ha of land will be occupied by temporary compounds, of which 19 ha is arable land. Approximately 21 ha of the 31 ha comprises storage areas, which are small and dispersed along the route, and which will not all be in simultaneous use. It is therefore considered that the extent of temporary habitat loss for construction compounds and storage areas is of minor concern for wintering birds given the large amount of similar habitat in the wider countryside.

3.11.1.260 The impact is predicted to be of local spatial extent, medium term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

3.11.1.261 The receptor is deemed to be of medium vulnerability, moderate recoverability and district value. The sensitivity of the receptor is, therefore, considered to be low.

Significance of the effects

3.11.1.262 Overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for temporary habitat loss from construction and use of construction compounds and storage areas to have adverse impacts on bats

Magnitude of impact

3.11.1.263 Temporary land take associated with the construction of the onshore HVDC converter/HVAC substation and HVAC booster station will result in loss of arable and hedgerow habitat. The arable habitat is of minimal value for bats, but hedgerows are utilised for commuting and foraging.

3.11.1.264 No hedgerow removal is required for the main construction compound or the landfall compound. Temporary construction compounds and storage areas will not require removal of hedgerows and would therefore have negligible impact on foraging bats.

3.11.1.265 Bat activity surveys at the HVAC booster station site found high levels of activity along the edge of New Covert CWS, and low levels of activity on other hedgerows in the vicinity of the temporary land take area. New Covert itself will not be directly affected, and therefore foraging in this location should be maintained. While loss of some internal hedgerows will reduce foraging habitat, bat activity levels in these hedgerows are lower, and alternative routes around the temporary land take will not be affected.

3.11.1.266 Bat activity surveys of the onshore HVDC converter/HVAC substation site found high levels of activity along the northern boundary and in one other location on the boundary of the temporary works area. The northern boundary will be retained, and alternative routes for bats will remain around the perimeter of the permanent land take area.

3.11.1.267 In addition, restoration of the temporary construction compounds will be undertaken, comprising hedgerow, trees and meadow creation, which will provide additional foraging and commuting habitat for bats once it has matured. Therefore, while there will be limited reduction in foraging and commuting habitat in the short-medium term, overall the ability of bats to forage and disperse through the landscape should not be significantly affected.

3.11.1.268 The impact is predicted to be of local spatial extent, medium term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

3.11.1.269 Bats are considered to be of medium vulnerability, moderate recoverability and county value. The sensitivity of the receptor is, therefore, considered to be medium.

Significance of the effects

Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for temporary habitat loss from construction of temporary access tracks to have adverse impacts on habitats

Magnitude of impact

3.11.1.270 Access tracks outside the main onshore cable corridor will be constructed in some locations to enable construction vehicles to access the works area. In addition, there are some locations where a haul road is or may be required over areas crossed by HDD. This section therefore assesses impacts of temporary tracks and haul roads outside the area affected by open cut trenching. Haul roads would be 6 m width, comprising crushed aggregate on geotextile or soil stabilisation.

3.11.1.271 The locations of the haul roads have been selected to avoid designated sites. Sensitive habitats such as hedgerows and woodland are also avoided wherever practicable. There are four watercourses crossed by HDD where a haul road will be required over the watercourses. These locations are summarised in volume 4, annex 3.5: Crossing Schedule (Onshore). Where haul roads are required over watercourses, some limited temporary habitat loss would occur for the width of the haul road. Methods for installing haul roads across watercourses are documented in the Outline CoCP (document reference A8.5) which accompanies the DCO application.

3.11.1.272 In the maximum design scenario of a two-phase cable installation with a gap between phases, the haul roads would be restored and re-laid between phases. Therefore, habitat loss could be of short to medium term duration before permanent restoration could be carried out.

3.11.1.273 The impact is predicted to be of local spatial extent, up to medium term duration, continuous and high reversibility. It is predicted that the impact will affect the receptors directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

3.11.1.274 The receptors are deemed to be of up to medium vulnerability, high recoverability and district value. The sensitivity of the receptor is, therefore, considered to be up to medium.

Significance of the effects

3.11.1.275 Overall, the sensitivity of the receptor is considered to be up to medium and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for construction and use of temporary access tracks to have adverse impacts on designated sites from airborne pollutants

Magnitude of impact

3.11.1.276 In areas where temporary haul roads or access tracks would run close to designated sites, there is potential for sites to be affected by airborne pollutants during construction, predominantly dust.

3.11.1.277 Measures will be implemented through the CoCP to control pollutants in order to minimise the potential for, and likely impacts of, airborne pollutants on sensitive habitats.

3.11.1.278 These will include establishment of a buffer zone between temporary access tracks and adjacent designated sites wherever practicable. Exceptions are tracks required adjacent to New Covert CWS for construction of the onshore HVAC booster station and an access track which runs parallel to Marriott's Way CWS south of Salle Park and crosses it in one location (utilising an existing farm track). Marriott's Way CWS is an old railway embankment and therefore the access track will run in an arable field close to the base of the embankment.

3.11.1.279 Further details of proposed dust control measures are provided in chapter 9: Air Quality.

3.11.1.280 The impact is predicted to be of local spatial extent, up to medium term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. Taking into account the dust control measures proposed, the magnitude is considered to be negligible.

Sensitivity of receptor

3.11.1.281 Designated sites are deemed to be of medium to high vulnerability, moderate recoverability and between county to international value. The sensitivity of the receptor is, therefore, considered to be high.

Significance of the effects

3.11.1.282 Overall, the sensitivity of the receptor is considered to be high and the magnitude is deemed to be negligible. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for construction and use of temporary access tracks to cause damage to designated sites from runoff of pollutants

Magnitude of impact

3.11.1.283 In areas where temporary access tracks would run close to designated sites, or where haul roads are constructed across watercourses crossed by HDD there is potential for sites to be affected by runoff of pollutants during construction or use.

3.11.1.284 Measures are proposed to minimise risk of runoff of pollutants reaching any adjacent designated site and to limit works areas in order to minimise the potential for and likely impacts of runoff of pollutants on sensitive habitats within designated sites. This will include the establishment of an appropriate buffer zone between the access tracks and adjacent designated sites. Further details of the pollution control measures proposed are provided in chapter 2: Hydrology and Flood Risk and in the Outline CoCP (document reference A8.5).

3.11.1.285 The impact is predicted to be of local spatial extent, up to medium term duration, continuous and medium reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

3.11.1.286 Designated sites are deemed to be of medium to high vulnerability, moderate recoverability and between county to international value. The sensitivity of the receptor is, therefore, considered to be high.

Significance of the effects

3.11.1.287 Overall, the sensitivity of the receptor is considered to be high and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for construction and use of temporary access tracks to have adverse impacts on habitats from airborne pollutants

Magnitude of impact

- 3.11.1.288 Construction and use of temporary access tracks or haul roads outside of the area affected by open cut trenching could have adverse effects on adjacent habitats, particularly hedgerows, watercourses and woodland from airborne pollutants during construction.
- 3.11.1.289 Measures will be implemented through the CoCP to control pollutants and limit works areas in order to minimise the potential for, and likely impacts of, airborne pollutants on sensitive habitats.
- 3.11.1.290 These will include establishment of a buffer zone between the access tracks and adjacent sensitive habitats.
- 3.11.1.291 The impact is predicted to be of local spatial extent, up to medium term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. Taking into account the dust control measures proposed, the magnitude is considered to be minor.

Sensitivity of receptor

- 3.11.1.292 Habitats in the vicinity of the access tracks are deemed to be of medium vulnerability, moderate recoverability and district value. The sensitivity of the receptor is, therefore, considered to be low.

Significance of the effects

- 3.11.1.293 Overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for construction and use of temporary access tracks to cause damage to habitats from runoff of pollutants

Magnitude of impact

- 3.11.1.294 Construction and use of temporary access tracks could have adverse effects on adjacent habitats, particularly hedgerows, watercourses and woodland from runoff of pollutants during construction.
- 3.11.1.295 Measures will be adopted and implemented through the CoCP to minimise risk of runoff of pollutants reaching adjacent habitats and to limit works areas in order to minimise the potential for, and likely impacts of, runoff pollutants on sensitive habitats. This will include the establishment of an appropriate buffer zone between the access tracks and adjacent habitats.
- 3.11.1.296 The impact is predicted to be of local spatial extent, up to medium term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. Taking into account the pollution control measures proposed, the magnitude is considered to be minor.

Sensitivity of receptor

- 3.11.1.297 Habitats in the vicinity of the access tracks are deemed to be of medium vulnerability, moderate recoverability and district value. The sensitivity of the receptor is, therefore, considered to be low.

Significance of the effects

- 3.11.1.298 Overall, the sensitivity of the receptor is considered to be low and the magnitude is deemed to be minor. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for temporary habitat loss and disturbance from construction and use of access tracks to have adverse impacts on wintering pink-footed goose

Magnitude of impact

- 3.11.1.299 Wintering bird surveys in 2016/2017 and 2017/2018 have found that pink-footed geese use fields within or adjacent to the Hornsea Three onshore cable corridor (volume 6, annex 3.9: Onshore Ornithology – Wintering and Migratory Bird Survey). Details are provided in section 3.7.
- 3.11.1.300 As with the assessment of impacts of trenching on pink-footed goose (paragraphs 3.11.1.77 to 3.11.1.95), the construction and use of the access tracks and the haul road could result in disturbance to the flocks of pink-footed geese that were recorded using beet fields at the north end of the onshore cable corridor.
- 3.11.1.301 Direct habitat loss would only occur if fields within the onshore cable corridor are planted with winter beet at the time that access tracks and haul roads are constructed and in use. Given the quantity of beet fields present in the area, it is not considered that temporary habitat loss will have a direct effect on the geese. The primary potential impact is therefore disturbance.
- 3.11.1.302 Assuming an impact zone of up to 500 m from the onshore cable corridor (Madsen 1985 and Section 3.11.1.83), and based on the distribution of the birds in 2016/17 and 2017/18, the majority of the birds would be outside the impact zone and therefore not disturbed. However, the surveys also suggest that the distribution of birds at any given time appears to be strongly linked to the location of sugar beet fields. Therefore, although it is possible that the birds might habituate to the disturbance caused by construction works to some extent, there remains the potential for disturbance to occur if construction takes place over winter and if winter beet fields are located on or close to the onshore cable corridor.
- 3.11.1.303 Given that the maximum design scenario involves a two-phase cable installation with a gap between phases of 3-4 years, the maximum potential impact of disturbance from cable installation could be displacement in two years over this period (assuming works close to the coast are carried out over winter in both years).
- 3.11.1.304 The impact is predicted to be of district spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor indirectly. The magnitude is, therefore, considered to be minor.

Sensitivity of receptor

3.11.1.305 The pink-footed goose population is deemed to be of medium vulnerability, medium recoverability and very high value. The sensitivity of the receptor is, therefore, considered to be high.

Significance of the effects

3.11.1.306 The worst case scenario would involve use of access routes and haul roads coinciding with the period when the birds are using fields on or adjacent to the onshore cable corridor. Baseline surveys (see volume 6, annex 3.9: Wintering and Migratory Bird Survey), indicate that the birds use the fields mainly from November to January while they are feeding on the sugar beet tops prior to harvesting. If works were to coincide with this period, and birds were foraging on or adjacent to the onshore cable corridor, there could be regular disturbance of a significant proportion of the SPA population of pink-footed goose, either directly (birds displaced from the onshore cable corridor itself during cable laying operations) or indirectly (from noise or visual disturbance outside the works area up to 500 m from the onshore cable corridor). Disturbed geese would be likely to be displaced to other winter beet fields further from the onshore elements of Hornsea Three. It is noted that the presence of birds on or adjacent to the onshore cable corridor would depend upon the landowner crop rotation plans at the time of construction, and any impacts would be of a relatively short duration.

3.11.1.307 The effect of this disturbance would be to potentially increase the energy expenditure of birds, from repeated flushing (should they try to settle on fields within or adjacent to the onshore cable corridor on a regular basis during the winter months), and / or forcing them to fly greater distances to fields outside the disturbed zone. In addition, it is possible that displacing birds from the onshore cable corridor and adjacent fields would result in the displaced birds competing for food with other birds from the SPA elsewhere. While it is difficult to determine whether such additional energy expenditure would result in significant impacts on survival rates during the winter months, there could be some effect on the population in the short term. Madsen (1995) reports that disturbance from farming on pink-footed geese in spring resulted in a reduction in reproductive success compared to birds which were not subject to disturbance, and while this relates to disturbance during the breeding season rather than the wintering season, it demonstrates that disturbance can affect pink-footed geese. Mitchell & Hearn (2004) note that most geese prefer to forage closer to roost sites, and while they are capable of occasionally travelling further when necessary, the possible effect of displacement on the energetics of the wintering geese cannot be ruled out.

3.11.1.308 Overall, the sensitivity of the receptor is considered to be high and the magnitude is deemed to be minor. The effect will, therefore, be of **moderate adverse** significance, which is significant in EIA terms.

Further mitigation and residual effect

3.11.1.309 If construction work on functionally linked sugar beet fields takes place between November and January inclusive, a pink-footed goose mitigation plan will be formulated and submitted to Natural England for approval in the 12 months prior to construction.

3.11.1.310 To minimise the risk of disturbance at all times and locations, noise reduction measure from industry best practice guidance will be implemented in line with the Outline CoCP (document reference A8.5) and EMP (document reference A8.6).

3.11.1.311 Where outdoor lighting is required, lighting units will be designed to minimise illumination outside of the construction works area, e.g. will be directional, task orientated and where possible, fully shielded. Further details regarding lighting during the construction phase will be developed post consent.

3.11.1.312 Further details of the proposed mitigation strategy are provided in the RIAA (document reference A5.2) which accompanies the DCO application. With further measures in place, it is considered that the residual impact magnitude could be reduced to negligible, and therefore the residual effect could be of **minor adverse** significance, which is not significant in EIA terms.

Future monitoring

3.11.1.313 Table 3.21 below outlines the proposed monitoring commitments for ecology and nature conservation during construction. These will be implemented through the CoCP and the EMP.

Table 3.21: Construction phase monitoring commitments.

Environmental effect	Monitoring commitment
Potential for open cut trenching and installation to cause loss of hedgerow habitat	As outlined in the Outline EMP (document reference A8.6) and the Outline LMP (document reference A8.7), an assessment of success of restoration of habitats such as hedgerows, comprising visits in years 1, 3 and 5 after planting to identify any planting failures that require reinstatement or other remedial works.
Potential disturbance to protected species	As outlined in the Outline EMP (document reference A8.6) and Outline CoCP (document reference A8.5), pre-construction surveys will be undertaken for protected species (a part of licence requirements) and also for areas where access was not granted during the original programme of surveys. The aim of the surveys is to provide up to date species data (particularly relevant for "mobile" species such as badgers) and to confirm the details of the mitigation measures to be implemented. Where construction is undertaken in two-phases, and the works are undertaken under separate protected species licences, the pre-construction surveys may have to be repeated. Where a mitigation plan is prepared for pink footed goose (see paragraph 3.11.1.93) monitoring of the mitigation measures would be undertaken (see the Report to Inform Appropriate Assessment (document reference A5.2)).

3.11.2 Operation and maintenance phase

3.11.2.1 The impacts of the onshore operation and maintenance of Hornsea Three on ecology and nature conservation have been assessed. The environmental impacts arising from the operation and maintenance of Hornsea Three are listed in Table 3.14 along with the maximum design scenario against which each operation and maintenance phase impact has been assessed.

3.11.2.2 A description of the predicted effect on ecology and nature conservation receptors caused by each identified impact is given in the following paragraphs.

Potential for operation to result in low-level visual disturbance, and noise and vibration disturbance of habitats and species during routine maintenance operations

Magnitude of impact

3.11.2.3 Regular inspections of the onshore cable, approximately every two to five years, will be undertaken via the link boxes. Should repairs to the cable become necessary; the cable will be accessed at the relevant jointing bays. Jointing bays will remain in place during operation. Access to the link boxes, jointing pits and transition joint bays will be via existing roads, tracks and field gates, with the permission of the landowner. These visits will be made by light vehicles only.

3.11.2.4 The onshore HVAC booster station and onshore HVDC converter/HVAC substation will be unmanned during operation, with monthly maintenance visits by light vehicles only using existing roads networks and the permanent access tracks constructed as part of the project.

3.11.2.5 Any activity is likely to be undertaken during daylight hours. Lighting will be limited to that required for maintenance only and to light pathways for health and safety purposes. No night time lighting is likely to be required on a routine basis and, therefore, operational maintenance is not likely to cause significant disturbance to crepuscular or nocturnal species.

3.11.2.6 No new significant damage or disruption to existing or reinstated habitats is anticipated during this period.

3.11.2.7 The impact is predicted to be of local spatial extent, short term duration, intermittent and moderate reversibility. It is predicted that the impact will affect the receptors directly. The magnitude is, therefore, considered to be negligible.

Sensitivity of receptor

3.11.2.8 The sensitivities of individual receptors are described under the impacts of construction section above.

3.11.2.9 Designated sites and habitats of conservation importance along the route and in the surrounding area are of up to very high vulnerability, low recoverability, and international value. Sensitivities vary from low to very high.

3.11.2.10 Sensitivity of populations of the majority of protected species in the area are of various levels of sensitivity; up to medium vulnerability, low recoverability and up to international value. Sensitivities vary from low to high.

Significance of the effects

3.11.2.11 Overall, the sensitivity of the receptor is considered to be up to very high and the magnitude is deemed to be negligible. The effect will, therefore, be of **negligible to minor adverse** significance, which is not significant in EIA terms.

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

Magnitude of impact

3.11.2.12 During maintenance operations and emergency works there will be the potential for some minor disturbance to designated habitats. Measures adopted as part of Hornsea Three during the operation and maintenance phase to limit the potential for, and likely impacts of, pollution including sediment-laden runoff would be set in place for the operation and maintenance phase where applicable, to protect surrounding habitats, including watercourses.

3.11.2.13 The impact of operation is predicted to be of local spatial extent, short term duration, intermittent and moderate reversibility. It is predicted that the impact will affect the ecology and nature conservation value of the area directly. With effective pollutant control, the magnitude is considered to be negligible.

Sensitivity of receptors

3.11.2.14 Designated habitats of conservation importance along the route and in the surrounding area are of up to very high vulnerability, low recoverability, and from district to international value where those habitats fall within the River Wensum SAC. Other habitats have a lower sensitivity, as previously described. Therefore, sensitivities of habitats affected by the onshore element of Hornsea Three vary from low to very high.

Significance of effect

3.11.2.15 Overall, it is predicted that the sensitivity of the receptor is considered to be up to very high and the magnitude is deemed to be negligible. The effect will, therefore, be of **negligible to minor adverse** significance, which is not significant in EIA terms.

Future monitoring

3.11.2.16 No ecology and nature conservation monitoring to test the predictions made within the operation and maintenance phase is considered necessary.

3.11.3 Decommissioning phase

3.11.3.1 The impacts of the onshore decommissioning of Hornsea Three on ecology and nature conservation have been assessed. The environmental impacts arising from the decommissioning of Hornsea Three are listed in Table 3.14 along with the maximum scenario against which each decommissioning phase impact has been assessed.

3.11.3.2 Taking into account the time delay between construction and decommissioning and the commitment to reinstatement of habitats lost due to construction, for the purpose of this assessment it is assumed that ecological baseline conditions during decommissioning will be similar to those assessed for construction in terms of the species likely to be present and the ecological value of those populations or assemblages. Species distributions and numbers may change due to natural population fluctuations, but any changes in distribution would need to be determined by surveys prior to decommissioning.

3.11.3.3 It is assumed that consultation would be undertaken with Natural England and other members of the Onshore EWG and the relevant local planning authorities prior to the commencement of decommissioning, to determine the exact nature of the decommissioning plan, and applicable regulations would be followed to minimise environmental effects. It is presumed that no additional hedgerow or tree clearance will be required.

3.11.3.4 Works will be undertaken in accordance with best practice guidelines and legislative requirements which apply at the time.

3.11.3.5 A description of the predicted effect on ecology and nature conservation receptors caused by each identified impact is given in the following paragraphs.

Potential for decommissioning of onshore HVAC booster station and onshore HVDC converter/HVAC substation to affect designated sites

Magnitude of impact

3.11.3.6 There are no designated sites close to the onshore HVDC converter/HVAC substation that could be affected by decommissioning.

3.11.3.7 The onshore HVAC booster station is adjacent to the New Covert CWS. There is therefore some potential for impacts from airborne or runoff pollution during decommissioning works to affect this designated site

3.11.3.8 A decommissioning plan will be produced to set out measures to be taken to minimise impacts prior to the commencement of works.

3.11.3.9 The impact is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. With pollution control measures in place, the magnitude is considered to be negligible.

Sensitivity of receptor

3.11.3.10 Designated sites are deemed to be of up to medium vulnerability, medium recoverability and county value. The sensitivity of the receptor is therefore, considered to be medium.

Significance of the effects

3.11.3.11 Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be negligible. The effect will, therefore, be of **negligible** significance, which is not significant in EIA terms.

Potential for decommissioning of onshore HVAC booster station and onshore HVDC converter/HVAC substation to affect habitats

Magnitude of impact

3.11.3.12 It is assumed that no additional hedgerow or woodland clearance would be required for decommissioning works. However, there is potential for some impacts from airborne or runoff pollution during decommissioning works to affect habitats in the vicinity of the works area.

3.11.3.13 A decommissioning plan will be produced to set out measures to be taken to minimise impacts prior to the commencement of works.

3.11.3.14 The impact is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. With pollution control measures in place, the magnitude is considered to be negligible.

Sensitivity of receptor

3.11.3.15 Habitats are deemed to be of medium vulnerability, medium recoverability and district value. The sensitivity of the receptor is therefore, considered to be medium.

Significance of the effects

3.11.3.16 Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be negligible. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Potential for decommissioning of onshore HVDC converter/HVAC substation and HVAC booster station to affect species

Magnitude of impact

3.11.3.17 Decommissioning has the potential to affect species, primarily through disturbance.

3.11.3.18 A decommissioning plan will be produced to set out measures to be taken to minimise impacts prior to the commencement of works. This would include a survey of the onshore HVDC converter/HVAC substation and HVAC booster station sites to determine whether any protected species such as bats have colonised them, and mitigation strategies would be developed accordingly if this proves to be the case.

3.11.3.19 It is highly unlikely that populations of protected species would occur at levels of significance above their current value, which for species recorded in the vicinity of the onshore HVAC booster station and onshore HVDC converter/HVAC substation is district to county level.

3.11.3.20 Impacts from decommissioning are predicted to be of local spatial extent, short term duration, and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be minor.

Sensitivity of receptor

3.11.3.21 Species are deemed to be of medium vulnerability, medium recoverability and district or county value. The sensitivity of the receptor is therefore, considered to be medium.

Significance of the effects

3.11.3.22 Overall, the sensitivity of the receptor is considered to be medium and the magnitude is deemed to be negligible. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

3.11.3.23 Overall, impacts from decommissioning would be considerably lower than impacts from construction.

Future monitoring

3.11.3.24 No ecology and nature conservation monitoring to test the predictions made within the decommissioning phase impact assessment is considered necessary.

3.12 Cumulative Effect Assessment methodology

3.12.1 Screening of other projects and plans into the Cumulative Effect Assessment

3.12.1.1 The Cumulative Effect Assessment (CEA) takes into account the impact associated with Hornsea Three together with other projects and plans. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise undertaken as part of the 'CEA long list' of projects (see volume 4, annex 5.2 and annex 5.3: Cumulative Effects Screening Matrix and Location of Cumulative Schemes). Each project on the CEA long list has been considered on a case by case basis for scoping in or out of this chapter's assessment based upon data confidence, impact-receptor pathways and the spatial/temporal scales involved.

3.12.1.2 In undertaking the CEA for Hornsea Three, it is important to bear in mind that other projects and plans under consideration will have differing potential for proceeding to an operational stage and hence a differing potential to ultimately contribute to a cumulative impact alongside Hornsea Three. For example, relevant projects and plans that are already under construction are likely to contribute to cumulative impact with Hornsea Three (providing impact or spatial pathways exist), whereas projects and plans not yet approved or not yet submitted are less certain to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors. For this reason, all relevant projects and plans considered cumulatively alongside Hornsea Three have been allocated into 'Tiers', reflecting their current stage within the planning and development process. This allows the CEA to present several future development scenarios, each with a differing potential for being ultimately built out. Appropriate weight may therefore be given to each Tier in the decision-making process when considering the potential cumulative impact associated with Hornsea Three (e.g. it may be considered that greater weight can be placed on the Tier 1 assessment relative to Tier 2). An explanation of each tier is included below:

- Tier 1: Hornsea Three considered alongside:

- Other project/plans currently under construction; and/or
- Those with consent, and, where applicable (i.e. for low carbon electricity generation projects), that have been awarded a Contract for Difference (CFD) but have not yet been implemented; and/or
- Those currently operational that were not operational when baseline data was collected, and/or those that are operational but have an on-going impact.

- Tier 2: All projects/plans considered in Tier 1, as well as:

- Those project/plans that have consent but, where relevant (i.e. for low carbon electricity generation projects) have no CFD; and/or
- Submitted but not yet determined.

- Tier 3: All projects/plans considered in Tier 2, as well as those on relevant plans and programmes likely to come forward but have not yet submitted an application for consent (the PINS programme of projects and the adopted development plan including supplementary planning documents are the most relevant sources of information, along with information from the relevant planning authorities regarding planned major works being consulted upon, but not yet the subject of a consent application). Specifically, this Tier includes all projects where the developer has advised PINS in writing that they intend to submit an application in the future, those projects where a Scoping Report is available and/or those projects which have published a PEIR.

3.12.1.3 It is noted that offshore wind farms seek consent for a maximum design scenario and the as built offshore wind farm will be selected from the range of consented scenarios. In addition, the maximum design scenario quoted in the application (and the associated Environmental Statement) are often refined during the determination period of the application. For example, it is noted that the Applicant for Hornsea Project One considered a maximum of 332 turbines within the Environmental Statement, but has gained consent for 240 turbines. Similarly, Hornsea Project Two has gained consent for an overall maximum number of turbines of 300, as opposed to 360 considered in the Environmental Statement and the as built number of turbines is likely to be less than this. A similar pattern of reduction in the project envelope from that assessed in the Environmental Statement, to the consented envelope and the 'as built' project is also seen across other offshore wind farms of relevance to this CEA. This process of refinement can result in a reduction to associated project parameters, for example, the number of cable trenches or the height of onshore substations. The CEA presented in this ecology and nature conservation chapter has been undertaken on the basis of information presented in the Environmental Statements for the other projects, plans and activities. Given that this broadly represents a maximum design scenario, the level of impact on ecology and nature conservation would likely be reduced from those presented here.

3.12.1.4 The specific projects scoped into this CEA and the Tiers into which they have been allocated, are outlined in Table 3.22. The projects included as operational in this assessment have been commissioned since the baseline studies for Hornsea Three were undertaken and as such were excluded from the baseline assessment.

3.12.1.5 No Tier 1 projects have been identified and, therefore, only Tier 2 and Tier 3 assessments have been undertaken.

Table 3.22: List of other projects and plans (with planning application reference) considered within the CEA.

Tier	Phase	Project/Plan	Distance from Hornsea Three	Details	Date of Construction (if applicable)	Overlap of construction phase with Hornsea Three construction phase	Overlap of operation phase with Hornsea Three operation phase
2	Construction/Operation and Maintenance/Decommissioning	C/7/2014/7030	0 m	(I) For a southern extension to Mangreen Quarry and ancillary works with progressive restoration to agriculture and nature conservation by the importation of inert restoration materials; (II) Retention of existing consented facilities at Mangreen Quarry; (III) Establishment of crossing point over Mangreen Lane; and (IV) Proposed variation to approved restoration scheme at Mangreen Quarry. Approved 02 October 2015	2019-2024	Yes	Yes
	Construction/Operation and Maintenance/Decommissioning	2011/1804/O	0 m	Residential led mixed use development of 1196 dwellings and associated uses including Primary School, Local Services (up to 1,850 sq. mtrs (GIA) of A1, A2, A3, A4, A5, D1 & B1 uses) comprising shops, small business units, community facilities/doctors' surgeries, sports pitches, recreational space, equipped areas of play and informal recreation spaces. Extension to Thickthorn Park and Ride including new dedicated slip road from A11. Approved 22 July 2013/2017/2089	2017-2026	Yes	Yes
	Construction/Operation and Maintenance/Decommissioning	2013/0092	7 m	Outline application for up to 20 residential units and associated highways works with all matters reserved. Approved 20 March 2014	2020-2028	Yes	Yes
	Construction/Operation and Maintenance/Decommissioning	2014/2611	21 m	The erection of 890 dwellings; the creation of a village heart to feature an extended primary school, a new village hall, a retail store and areas of public open space; the relocation and increased capacity of the allotments; and associated infrastructure including public open space and highway works. Approved 01 November 2016	2018-2028	Yes	Yes
	Construction/Operation and Maintenance/Decommissioning	20170789	55 m	Erection of Grain Store (Revised Proposal) Approved 19 July 2017	2020	Yes	Yes
	Construction/Operation and Maintenance/Decommissioning	20151644	310 m	Demolition of four existing units and development of 10 residential units, together with associated access (Outline) Approved 10 June 2016	2022-2023	Yes	Yes
	Construction/Operation and Maintenance/Decommissioning	2015/1697	312 m	Erection of 27 dwellings, access, roads, open space, parking areas and associated works. Approved 27 June 2016	2019-2020	Yes	Yes

Tier	Phase	Project/Plan	Distance from Hornsea Three	Details	Date of Construction (if applicable)	Overlap of construction phase with Hornsea Three construction phase	Overlap of operation phase with Hornsea Three operation phase
	Construction/Operation and Maintenance/Decommissioning	20170052	303 m	Greater Norwich Food Enterprise Zone Approved 31 October 2017	Not known	Yes	Yes
	Construction/Operation and Maintenance/Decommissioning	2012/1836	338 m	Outline application for residential development (20 Dwellings) and associated infrastructure works, including highway improvement works at the Mill Road/School Lane/Burnthouse Lane junction. Approved 29 April 2014	2018-2020	Yes	Yes
	Construction/Operation and Maintenance/Decommissioning	2016/1303	699 m	Construction of a new field trials building with associated services yard and on-site parking and alterations to existing agricultural building. Approved 05 September 2016	2020	Yes	Yes
3	Construction/Operation and Maintenance/Decommissioning	EN010079	0 m	Norfolk Vanguard is a proposed offshore windfarm with an approximate capacity of 1800 MW off the coast of Norfolk. Pre-application stage PEIR October 2017	2020-2024	Yes	Yes

3.12.2 Maximum design scenario

- 3.12.2.1 The maximum design scenarios identified in Table 3.23 have been selected as those having the potential to result in the greatest impact on an identified receptor or receptor group. The cumulative impacts presented and assessed in this section have been selected from the details provided in the Hornsea Three project description (volume 1, chapter 3: Project Description), as well as the information available on other projects and plans, in order to inform a 'maximum design scenario'. Effects of greater adverse significance are not predicted to arise should any other development scenario, based on details within the project Design Envelope (e.g. different turbine layout), to that assessed here be taken forward in the final design scheme.
- 3.12.2.2 None of the cumulative developments are proposed in the vicinity of designated sites or main watercourses that are potentially affected by Hornsea Three. Therefore, the potential for cumulative impacts is restricted to habitat loss or disturbance to species as a result of cable installation or decommissioning (in the event that the construction or decommissioning phases overlap with that of Hornsea Three, or if operational maintenance works overlap with construction of other developments). In these scenarios there would be a greater potential for displacement or disturbance for species.
- 3.12.2.3 Therefore, potential cumulative impacts on VERs from impacts arising from HDD operations, construction of access tracks, temporary compounds and permanent infrastructure have been scoped out of the cumulative impact assessment.
- 3.12.2.4 At present, there is insufficient information on the timing of construction for the developments listed in Table 3.22 to be able to determine whether overlap with cabling works would occur. The maximum design scenario for Hornsea Three is for two phases of cabling three years apart. There are therefore, two potential windows for overlap with construction of developments close to the onshore cable corridor.

Table 3.23: Maximum design scenario considered for the assessment of potential cumulative impacts on ecology and nature conservation.

Potential impact	Maximum design scenario	Justification
Construction phase		
Potential for open cut trenching and installation of cables and associated temporary construction compounds to habitat loss and/or severance for a number of species	Tier 2 <ul style="list-style-type: none"> • 2014/2611; • 2011/1804/O; • 2015/1697; • 2012/1836; • 2013/0092; • 20151644; • 20170789; • C/7/2014/7030; and • 20170052. 	Outcome of the CEA will be greatest when the greatest number of other schemes, present or planned, are considered.

Potential impact	Maximum design scenario	Justification
	Tier 3 <ul style="list-style-type: none"> • EN010079. 	
Operation and maintenance phase		
Potential for operation to result in low-level visual disturbance, and noise and vibration disturbance of habitats and wildlife during routine maintenance operations	Tier 2 <ul style="list-style-type: none"> • 2014/2611; • 2011/1804/O; • 2015/1697; • 2012/1836; • 2013/0092; • 20151644; • 20170789; • C/7/2014/7030; and • 20170052. Tier 3 <ul style="list-style-type: none"> • EN010079. 	Outcome of the CEA will be greatest when the greatest number of other schemes, present or planned, are considered.
Decommissioning phase		
Potential for decommissioning of HVAC booster station and onshore HVDC converter/HVAC substation to affect designated sites, habitats and species	Tier 2 <ul style="list-style-type: none"> • 2014/2611; • 2011/1804/O; • 2015/1697; • 2012/1836; • 2013/0092; • 20151644; • 20170789; • C/7/2014/7030; and • 20170052. Tier 3 <ul style="list-style-type: none"> • EN010079. 	Outcome of the CEA will be greatest when the greatest number of other schemes, present or planned, are considered.

3.13 Cumulative Effect Assessment

- 3.13.1.1 A description of the significance of cumulative effects upon ecology and nature conservation receptors arising from each identified impact is given below.

3.13.2 Construction phase

Cumulative potential for open cut trenching and installation of cables leading to habitat loss and/or severance for a number of species

Tier 2

- 3.13.2.1 Tier 2 developments will result in permanent habitat loss and construction of these developments could also give rise to disturbance impacts, which have potential to result in greater disturbance to species if construction overlaps with cable installation.
- 3.13.2.2 There are three locations in particular where residential developments are proposed close to the Hornsea Three onshore cable corridor.
- 3.13.2.3 These are:
- Easton (developments 20170052 and 2014/2611);
 - Little Melton (developments 2013/0092, 2013/0086, 2015/2630, 2012/1836 and 2015/1697); and
 - Hethersett (developments 2015/1594, 2015/1681 and 2017/0151).
- 3.13.2.4 Surveys to determine presence/absence of protected and other species in the vicinity of these developments are summarised in paragraph 3.13.2.6.
- Easton area: Surveys have determined that there are known populations of GCN, reptiles, water voles, and low levels of bat foraging activity. Any cumulative effects in this location would therefore be restricted to wintering and breeding birds only, and effects would only operate for the short time period between commencement of cabling and restoration works for each of the two phases, i.e. for no more than a few months for each phase, and it is therefore considered that there is no potential for significant cumulative effects in this location.
 - Little Melton and Hethersett: Populations of GCN and reptiles have been found in the adjacent area, and high levels of bat foraging activity occur along parts of the onshore cable corridor between the two clusters of developments. Potential cumulative effects on these species are therefore considered in further detail below.
- 3.13.2.5 Cumulative disturbance effects would only occur in the event that construction of some or all of these developments occur at the same time as cabling works. If this happens, displacement of mobile species such as breeding or wintering birds could take place across a wider area than would be the case for the cabling works in isolation but this is not considered likely to be significant.

Great crested newts

- 3.13.2.6 Known populations of GCN have been identified in two ponds south of the onshore cable corridor and north of Heathersett. The Little Melton developments are separated from this population by roads so cumulative effects from these developments are unlikely. The Heathersett developments, particularly 2017/0151, are within countryside with connectivity to the GCN ponds. Therefore, there is some potential for cumulative habitat losses if cabling works for Hornsea Three are undertaken during or after the construction of development 2017/1051. However, as the habitat losses arising from Hornsea Three are only temporary and restoration would occur after each phase with appropriate mitigation secured via a GCN licence, it is not considered likely that cumulative losses of terrestrial habitat would be of any greater significance than the effects for Hornsea Three (reported in section 3.11).

Reptiles

- 3.13.2.7 One record of grass snake was recorded south of Little Melton. The Little Melton developments are north of an existing road and therefore it is not considered likely that these developments would result in cumulative effects on reptiles in conjunction with Hornsea Three.

Wintering and breeding birds

- 3.13.2.8 Effects would only occur for the short time period between commencement of cabling and restoration works for each of the two phases, i.e. for no more than a few months for each phase in each location. If cabling and restoration occurs before the developments take place, any effects the developments may have would not be increased by Hornsea Three. If cabling occurs after the developments take place, while there is some small potential for a cumulative effect on species that are displaced by the cabling works, given that there would be slightly less habitat for them to be displaced to, there remains a large amount of alternative habitat available for these species in the wider area for the short duration of the cabling works close to the development clusters assessed in this section. It is therefore considered that there is no potential for significant cumulative effects on these species.
- 3.13.2.9 No cumulative effects on wintering geese are anticipated, given the location of the cumulative developments in relation to the key areas for foraging geese.

Foraging bats

- 3.13.2.10 Several hedgerows with high levels of bat activity occur in the section of the onshore cable corridor that runs between Little Melton and Heathersett, two of which are bisected by the onshore cable corridor. One of these will be retained via HDD, and the other will be severed, with an artificial hedge used to maintain connectivity. It is possible that bats foraging on sites affected by both clusters of developments could forage along flightlines affected by the Hornsea Three, but given that one flightline will be retained and the other will be mitigated, any effects on foraging bats caused by the loss of habitat for developments are unlikely to be exacerbated by Hornsea Three cabling works. It is therefore not considered that there would be any significant cumulative effect on foraging bats.

Magnitude of impact

3.13.2.11 The impact is predicted to be of local / spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptors directly. The magnitude of any cumulative impact is considered to be negligible to minor.

Sensitivity of receptor

3.13.2.12 Species of conservation importance in the areas identified above are up to medium vulnerability, medium recoverability, and between district and county value. Sensitivities vary from low to medium.

Significance of the effects

3.13.2.13 Overall, the sensitivity of the receptors is considered to be up to medium and the magnitude is deemed to be negligible to minor. The effect will, therefore, be of **negligible to minor adverse** significance, which is not significant in EIA terms.

Tier 3

Magnitude of impact

3.13.2.14 Based on the timescales outlined in volume 4, annex 5.2: Cumulative Effects Screening Matrix, it is possible that onshore cabling works for Hornsea Three and Norfolk Vanguard could be undertaken in the same approximate timescale. Should this occur, there would be potential for a greater disturbance and displacement effect on species such as bats and breeding / wintering birds (excluding pink-footed goose as this species does not occur this far from the coast) at the point where the cable corridors cross. However, it is not considered that the impacts would be sufficiently great to result in a combined effect of greater significance than would be the case for each project individually. Furthermore, it is noted that both projects would be subject to measures to manage and minimise potential impacts in accordance with their respective CoCPs.

3.13.2.15 A further potential cumulative impact was considered for mobile species, such as bats, given that the two onshore cable corridors could result in severance of hedgerows in both north-south and east-west directions. There could therefore be a greater fragmentation impact for bat species that prefer to commute along linear features such as hedgerows.

3.13.2.16 However, the Hornsea Three onshore cable corridor has no significant fragmentation effect at the crossover point. From approximately 1.5 km north of the Norfolk Vanguard cable corridor route to 1 km south, there are six sections of HDD crossing for Hornsea Three. These include HDD under all but one hedgerows, one block of woodland, and the HDD under Blackwater Drain. Therefore, for an approximately 2.5 km length of the Hornsea Three onshore cable corridor, there is no removal of woodland habitat and minimal hedgerow removal associated with Hornsea Three. It can therefore be concluded that the Hornsea Three project does not have any significant fragmentation effect on habitats or species at the point where the onshore cable corridor crosses Norfolk Vanguard and would not therefore contribute to any cumulative effect in this location.

3.13.2.17 The impact is predicted to be of local / spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptors directly. The magnitude of any cumulative impact is considered to be negligible to minor.

Sensitivity of receptor

3.13.2.18 Species of conservation importance in the areas identified above are up to medium vulnerability, medium recoverability, and between district and county value. Sensitivities vary from low to medium.

Significance of the effects

3.13.2.19 Overall, the sensitivity of the receptors is considered to be up to medium and the magnitude is deemed to be negligible to minor. The effect will, therefore, be of **negligible to minor adverse** significance, which is not significant in EIA terms.

Future monitoring

3.13.2.20 No ecological and nature conservation monitoring (other than that proposed for Hornsea Three in Table 3.21) to test the predictions made within the construction phase cumulative impact assessment is considered necessary.

3.13.3 Operation and maintenance phase

Potential for operation to result in low-level visual disturbance, and noise and vibration disturbance of habitats and wildlife during routine maintenance operations

Tier 2 and 3

3.13.3.1 Regular inspections of the onshore cable, approximately every two to five years, will be undertaken via the link boxes. Should repairs to the cable become necessary; the cable will be accessed at the relevant jointing pits and pulled between them. Jointing bays will remain in place during operation. Access to the link boxes, jointing pits and transition joint bays will be via existing roads, tracks and field gates, with the permission of the landowner. These visits will be made by light vehicles only. In the unlikely event that a larger vehicle is required to access the jointing pits or transition bays, and existing roads and tracks do not allow suitable access, a temporary metal track (or similar) would be constructed to gain access. Any possible impacts would be kept to a minimum.

3.13.3.2 Any activity is likely to be undertaken during daylight hours. Lighting will be limited to that required for maintenance only and to light pathways for health and safety purposes. No night time lighting is likely to be required on a routine basis and, therefore, operational maintenance is not likely to cause significant disturbance to crepuscular or nocturnal species.

3.13.3.3 No new significant damage or disruption to existing or reinstated habitats is anticipated during this period.

3.13.3.4 The potential for cumulative disturbance effects on species would therefore be restricted to overlap between maintenance inspections and construction of Tier 2 or 3 developments, along the parts of the route close to construction sites.

Magnitude of impact

3.13.3.5 The impact is predicted to be of local / spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptors directly. Given the limited extent of works proposed, the magnitude is considered to be negligible.

Sensitivity of receptor

3.13.3.6 Designated sites and habitats of conservation importance along the route and in the surrounding area are of up to very high vulnerability, low recoverability, and international value. Sensitivities vary from low to very high.

Significance of the effects

3.13.3.7 Overall, the sensitivity of the receptor is considered to be up to very high and the magnitude is deemed to be negligible. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Future monitoring

3.13.3.8 No ecological and nature conservation monitoring to test the predictions made within the operation and maintenance phase cumulative impact assessment is considered necessary.

3.13.4 Decommissioning phase

Potential for decommissioning of the onshore HVAC booster station and onshore HVDC converter/HVAC substation to affect designated sites, habitats and species

Tier 2 and 3

3.13.4.1 Decommissioning of the onshore HVAC booster station and HVDC converter/HVAC substation has the potential to affect species, primarily through disturbance. There is also the potential for some impacts from airborne or runoff pollution during decommissioning works to affect habitats and New Covert CWS. There are no designated sites close to the onshore HVDC converter/HVAC substation that could be affected by decommissioning.

3.13.4.2 Given the lifetime of the Hornsea Three it is considered unlikely that the construction phase of the Tier 2 or Tier 3 developments listed in Table 3.22 would overlap with the decommissioning of Hornsea Three. The significance levels of effects predicted for Hornsea Three would not be any different in the cumulative scenario.

Magnitude of impact

3.13.4.3 The impact is predicted to be of local spatial extent, short term duration, intermittent and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be negligible.

Sensitivity of receptor

3.13.4.4 Designated sites, habitats and species are deemed to be of up to medium vulnerability, low recoverability and up to national value. The sensitivity of the receptors is therefore, considered to be medium.

Significance of the effects

3.13.4.5 Overall, it is predicted that the sensitivity of the receptors is considered to be medium and the magnitude is deemed to be negligible. The effect will, therefore, be of **negligible to minor adverse** significance, which is not significant in EIA terms.

Future monitoring

3.13.4.6 No ecological and nature conservation monitoring to test the predictions made within the decommissioning phase cumulative impact assessment is considered necessary

3.14 Transboundary effects

3.14.1.1 A screening of transboundary impacts has been carried out and is presented in volume 4, annex 5.4: Transboundary Impacts Screening Note. This screening exercise identified that there was no potential for significant transboundary effects with regard to onshore ecology and nature conservation from Hornsea Three upon the interests of other European States.

3.15 Inter-related effects

3.15.1.1 Inter-relationships are considered to be the impacts and associated effects of different aspects of Hornsea Three on the same receptor. These are considered to be:

- Project lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of the project (construction, operation and maintenance, and decommissioning), to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three key project stages (e.g. subsea noise effects from piling, operational turbines, vessels and decommissioning).
- Receptor led effects: Assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor. As an example, all effects on a receptor, such as direct habitat loss or disturbance, sediment plumes, scour, jack-up vessel use etc., may interact to produce a different, or greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects might be short term, temporary or transient effects, or incorporate longer term effects.

3.15.1.2 A description of the likely inter-related effects arising from Hornsea Three on ecology and nature conservation is provided in chapter 11: Inter-Related Effects (Onshore).

3.16 Conclusion and summary

3.16.1.1 Habitats present within the permanent and temporary land take for the onshore elements of Hornsea Three are predominantly arable land (75%) of little intrinsic conservation value. There are several designated sites within or adjacent to the onshore cable corridor, including the River Wensum SAC/SSSI, Norfolk Valley Fens SAC/Booton Common SSSI and Kelling Heath SSSI. Several CWSs are also present. Species surveys have confirmed the presence of white clawed crayfish, GCN, reptiles, breeding and wintering birds, water vole, otter, bats and badgers in various locations within or adjacent to the onshore cable corridor. Other than wintering pink-footed goose, no species populations were considered to be of importance at higher than county level.

3.16.1.2 No direct impacts on designated sites from cable installation will occur as HDD is being employed under all designated sites within the onshore cable corridor. HDD is also proposed for all 'main' and numerous 'ordinary' watercourses, as well as large areas of woodland which could not be avoided.

3.16.1.3 Depending on the time of construction, there is potential for a significant disturbance effect on pink-footed goose at the north end of the onshore cable corridor during the construction phase, where a significant percentage of the North Norfolk Coast SPA population has been recorded using sugar beet fields within or adjacent to the onshore cable corridor around Weybourne. If construction of Hornsea Three takes place on the functionally linked sugar beet fields between November and January (inclusive), a pink-footed goose mitigation plan will be formulated and submitted to Natural England for approval in the 12 months prior to construction, which will reduce the residual effect to **minor adverse**.

3.16.1.4 Combined habitat losses during construction have been assessed and are not considered to be significant in EIA terms. Approximately 7.39 km of hedgerow will need to be removed to facilitate cable installation. This represents approximately 12% of the total hedgerow resource in the Hornsea Three study area. Restoration would be undertaken after each cabling phase. The maximum duration of construction for all onshore elements of Hornsea Three would be eight years, which assumes construction across two phases with a three-year gap in-between. Following the completion of construction there would be a period of five years (minimum) for the new hedgerow planting to fully mature and the effect considered to be of **minor adverse** significance. Given that the removed hedgerows will be replanted with a species-rich mix of native species the effect will be **minor positive** once the hedgerow habitat matures.

3.16.1.5 Minor adverse effects on species include impacts on GCN, reptiles, breeding and wintering birds, bats and badgers from habitat loss and disturbance during construction. Appropriate measures adopted via the CoCP and EMP would ensure that these impacts are minimised, and none of the effects are considered to be significant in EIA terms. Effects during the operation and maintenance phase include disturbance impacts on species during routine maintenance but these would not be significant in EIA terms.

3.16.1.6 Effects during decommissioning would primarily relate to disturbance to species during decommissioning works but these would not be significant in EIA terms.

3.16.1.7 Cumulative effects from projects screened into the assessment have been assessed using a tiered approach. There is some potential for cumulative effects with the Norfolk Vanguard onshore cable corridor but no significant cumulative effect from the two developments is predicted given that in the vicinity of the Vanguard corridor, the Hornsea Three onshore cable corridor has no fragmentation effect as all hedgerows in this area will be protected/avoided via the use of HDD. Screening of potential transboundary impacts (as presented in volume 4, annex 5.4: Transboundary Impacts Screening Note) has identified that there is no potential for significant transboundary effects with regard to ecology and nature conservation.

3.16.1.8 A summary of the findings of the ecology and nature conservation assessment is presented in Table 3.24.

Table 3.24: Summary of potential environment effects, mitigation and monitoring.

Description of impact	Measures adopted as part of the project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
Construction Phase							
Potential for open cut trenching and installation of cables to cause loss of hedgerow habitat	Replacement planting with a native mix of species.	Minor	Medium	Minor Adverse (not significant in EIA terms)	Once the replacement planting has matured, the impact on the hedgerow habitat will be minor positive as so significant long-term net loss of hedgerow habitat will occur and all hedgerows will be replanted with a species-rich planting mix.	Minor Positive	As outlined in Outline EMP (document reference 8.6) monitoring will be undertaken of areas of new hedgerow planting. The aim of the monitoring will be to determine the effectiveness of the new planting.
Potential for open cut trenching and installation of cables to cause loss, damage to and disturbance of watercourses	Measures to minimise and control pollutants during construction (see Table 3.19)	Minor	Medium	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for open cut trenching and installation of cables to cause loss, damage to and disturbance of woodland	Measures to minimise and control pollutants during construction (see Table 3.19)	Minor	Medium	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for open cut trenching and installation of cables to cause loss, damage to and disturbance of arable field margins	Measures to minimise and control pollutants during construction (see Table 3.19)	Minor	Low	Negligible (not significant in EIA terms)	N/A	N/A	None
Potential for open cut trenching and installation of cables to cause damage to designated sites from airborne pollutants	Final selection of onshore cable corridor has avoided designated sites where practicable.	Negligible	Very high	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for open cut trenching and installation of cables to cause damage to habitats from airborne pollutants	Measures to minimise and control pollutants during construction (see Table 3.19)	Negligible	High	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for open cut trenching and installation of cables to cause damage to designated sites from runoff pollutants	Measures to minimise and control pollutants during construction (see Table 3.19)	Negligible	Very high	Minor Adverse (not significant in EIA terms)	N/A	N/a	None
Potential for open cut trenching and installation of cables to cause damage to habitats from runoff pollutants	Measures to minimise and control pollutants during construction (see Table 3.19)	Negligible	High	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for open cut trenching and installation of cables leading to habitat loss and/or severance for GCN	Measures to minimise impacts during construction outlined in the Outline CoCP and Outline EMP.	Minor	Medium	Minor Adverse (not significant in EIA terms)	N/A	N/A	As outlined in the Outline EMP (document reference 8.6) pre-construction surveys will be undertaken

Description of impact	Measures adopted as part of the project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
Potential for open cut trenching and installation of cables leading to habitat loss and/or severance for reptiles	Measures to minimise impacts during construction outlined in the Outline CoCP and Outline EMP	Minor	Low	Minor Adverse (not significant in EIA terms)	N/A	N/A	in accordance with licence requirements and of areas where access not previously granted.
Potential for open cut trenching and installation of cables leading to habitat loss and/or severance for breeding birds	Measures to minimise impacts during construction outlined in the Outline CoCP and Outline EMP	Minor	Medium	Minor Adverse (not significant in EIA terms)	N/A	N/A	
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	Measures to minimise impacts during construction outlined in the Outline CoCP and Outline EMP	Minor	High	Moderate Adverse (significant in EIA terms)	If construction work on functionally linked sugar beet fields takes place between November and January inclusive, a pink-footed goose mitigation plan will be formulated and submitted to Natural England for approval in the 12 months prior to construction.	Minor Adverse (not significant in EIA terms)	None
Potential for open cut trenching and installation of cables to cause habitat loss and disturbance to other wintering birds	Measures to minimise impacts during construction outlined in the Outline CoCP and Outline EMP	Minor	Low	Minor Adverse (not significant in EIA terms)	N/A	N/A	As outlined in the Outline EMP (document reference 8.6) pre-construction surveys will be undertaken in accordance with licence requirements and of areas where access not previously granted.
Potential for open cut trenching and installation of cables leading to habitat loss and/or severance for bats	Measures to minimise impacts during construction outlined in the Outline CoCP and Outline EMP	Minor	Medium	Minor Adverse (not significant in EIA terms)	N/A	N/A	
Potential for open cut trenching and installation of cables leading to habitat loss and/or severance for water voles	Measures to minimise impacts during construction outlined in the Outline CoCP and Outline EMP	Negligible	Medium	Negligible (not significant in EIA terms)	N/A	N/A	
Potential for open cut trenching and installation of cables leading to habitat loss and/or severance for otters	Measures to minimise impacts during construction outlined in the Outline CoCP and Outline EMP	Negligible	Medium	Negligible (not significant in EIA terms)	N/A	N/A	
Potential for open cut trenching and installation of cables to cause habitat loss and disturbance to badgers	Measures to minimise impacts during construction outlined in the Outline CoCP and Outline EMP	Minor	Low	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for HDD beneath watercourses to cause damage and disturbance to designated sites	Final selection of onshore cable corridor has avoided designated sites where practicable	Negligible	High	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for HDD beneath watercourses to cause damage and disturbance to other watercourses and habitats	Selection of appropriate locations for HDD installation	Negligible	Medium	Minor Adverse (not significant in EIA terms)	N/A	N/A	None

Description of impact	Measures adopted as part of the project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
Potential for HDD beneath watercourses to cause habitat loss and disturbance to breeding birds	Survey methods will incorporate standard best practice guidance	Minor	Medium	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for HDD beneath watercourses to cause habitat loss and disturbance to bats	Survey methods will incorporate standard best practice guidance	Minor	Medium	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for HDD beneath watercourses to cause habitat loss and disturbance to water voles	Survey methods will incorporate standard best practice guidance	Minor	Medium	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for HDD beneath watercourses to cause habitat loss and disturbance to otters	Survey methods will incorporate standard best practice guidance	Minor	Medium	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for permanent habitat loss from construction of the HVAC booster station and HVDC converter/HVAC substation to have adverse impacts on habitats (hedgerows)	Measures to minimise impacts during construction outlined in CoCP and Outline EMP	Minor	Low	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for construction of the HVAC booster station and HVDC converter/HVAC substation to have adverse impacts on designated sites from airborne pollutants	Measures to minimise impacts during construction outlined in CoCP and Outline EMP	Negligible	Medium	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for construction of the HVAC booster station and HVDC converter/HVAC substation to cause damage to designated sites from runoff pollutants	Measures to minimise impacts during construction outlined in CoCP and Outline EMP	Negligible	Medium	Negligible (not significant in EIA terms)	N/A	N/A	None
Potential for construction of the HVAC booster station and HVDC converter/HVAC substation to have adverse impacts on habitats from airborne pollutants	Measures to minimise impacts during construction outlined in CoCP and Outline EMP	Negligible	Low	Negligible (not significant in EIA terms)	N/A	N/A	None
Potential for construction of the HVAC booster station and HVDC converter/HVAC substation to cause damage to designated sites from runoff pollutants	Measures to minimise impacts during construction outlined in CoCP and Outline EMP	Minor	Low	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for permanent habitat loss from construction of the HVAC booster station and HVDC converter/HVAC substation to have adverse impacts on breeding birds	Measures to minimise impacts during construction outlined in CoCP and Outline EMP	Minor	Medium	Minor Adverse (not significant in EIA terms)	N/A	N/A	None

Description of impact	Measures adopted as part of the project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
Potential for permanent habitat loss from construction of the HVAC booster station and HVDC converter/HVAC substation to have adverse impacts on wintering birds	Measures to minimise impacts during construction outlined in CoCP and Outline EMP	Minor	Low	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for permanent habitat loss from construction of the HVAC booster station and HVDC converter/HVAC substation to have adverse impacts on bats	Measures to minimise impacts during construction outlined in CoCP and Outline EMP	Minor	Medium	Minor Adverse (not significant in EIA terms)	N/a	N/a	None
Potential for temporary habitat loss from construction of construction compounds to have adverse impacts on habitats	Measures to minimise impacts during construction outlined in CoCP and Outline EMP	Minor	Low	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for construction of construction compounds to have adverse impacts on designated sites from airborne pollutants	Construction compounds located outside designated sites. Measures to minimise impacts during construction outlined in CoCP and Outline EMP	Negligible	High	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for construction of compounds to cause damage to designated sites from runoff pollutants	Construction compounds located outside designated sites. Measures to minimise impacts during construction outlined in CoCP and Outline EMP	Negligible	High	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for construction of construction compounds to have adverse impacts on habitats from airborne pollutants	Measures to minimise impacts during construction outlined in CoCP and Outline EMP	Negligible	Low	Negligible (not significant in EIA terms)	N/A	N/A	None
Potential for construction of temporary compounds to cause damage to habitats from runoff pollutants	Measures to minimise impacts during construction outlined in CoCP and Outline EMP	Negligible	Low	Negligible (not significant in EIA terms)	N/A	N/A	None
Potential for temporary habitat loss from construction of construction compounds to have adverse impacts on wintering birds	Survey methods will incorporate standard best practice guidance	Minor	Low	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for temporary habitat loss from construction of construction compounds to have adverse impacts on bats	Measures to minimise impacts during construction outlined in CoCP and Outline EMP	Minor	Medium	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for temporary habitat loss from construction of access tracks to have adverse impacts on habitats	Measures to minimise and control pollutants during construction (see Table 3.19)	Minor	Medium	Minor Adverse (not significant in EIA terms)	N/A	N/A	None

Description of impact	Measures adopted as part of the project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
Potential for construction and use of access tracks to have adverse impacts on designated sites from airborne pollutants	Final selection of onshore cable corridor to avoid designated sites where practicable Measures to minimise and control pollutants during construction (see Table 3.19)	Negligible	High	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for construction and use of access tracks to cause damage to designated sites from runoff pollutants	Final selection of onshore cable corridor to avoid designated sites where practicable	Minor	High	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for construction and use of access tracks to have adverse impacts on habitats from airborne pollutants	Measures to minimise and control pollutants during construction (see Table 3.19)	Minor	Low	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for construction and use of access tracks to cause damage to habitats from runoff pollutants	Measures to minimise and control pollutants during construction (see Table 3.19)	Minor	Low	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for temporary habitat loss and disturbance from construction and use of access tracks to have adverse impacts on wintering pink-footed goose	General measures to minimise impacts during construction outlined in CoCP and Outline EMP.	Minor	High	Moderate Adverse (significant in EIA terms)	If construction work on functionally linked sugar beet fields takes place between November and January inclusive, a pink-footed goose mitigation plan will be formulated and submitted to Natural England for approval in the 12 months prior to construction.	Minor Adverse (not significant in EIA terms)	See the Report to Inform Appropriate Assessment (document reference 5.2).
Operation and maintenance Phase							
Potential for operation to result in low-level visual disturbance, and noise and vibration disturbance of habitats and species during routine maintenance operations	Operation and maintenance phase measures shown in Table 3.19	Negligible	Low to very high	Negligible to Minor Adverse (not significant in EIA terms)	N/A	N/A	None
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	Operation and maintenance phase measures shown in Table 3.19	Negligible	Low to very high	Negligible to Minor Adverse (not significant in EIA terms)	N/A	N/A	None

Description of impact	Measures adopted as part of the project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
Decommissioning Phase							
Potential for decommissioning of HVAC booster station and onshore HVDC converter/HVAC substation to affect designated sites	Measures to be adopted during decommissioning will be similar to those adopted during construction	Negligible	Medium	Negligible (not significant in EIA terms)	N/A	N/A	None
Potential for decommissioning of HVAC booster station and onshore HVDC converter/HVAC substation to affect habitats	Measures to be adopted during decommissioning will be similar to those adopted during construction	Negligible	Medium	Minor Adverse (not significant in EIA terms)	N/A	N/A	None
Potential for decommissioning of onshore HVDC converter/HVAC substation and HVAC booster station to affect species	Measures to be adopted during decommissioning will be similar to those adopted during construction	Minor	Medium	Minor Adverse (not significant in EIA terms)	N/A	N/A	None

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