



Hornsea Project Four: Preliminary Environmental Information Report (PEIR)

Volume 3, Chapter 3: Ecology and Nature Conservation

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Annexes

Annex	Title
3.1	Extended Phase 1 Habitat Survey Report
3.2	Onshore Ornithology - Wintering and Migratory Birds Survey Report
3.4	Great Crested Newt Environmental DNA (eDNA) Survey Report
3.10	Badger Survey Report (confidential)

Glossary

Term	Definition
Code of Construction Practice (CoCP)	A document detailing the overarching principles of construction, contractor protocols, construction-related environmental management measures, pollution prevention measures, the selection of appropriate construction techniques and monitoring processes
Commitment	A term used interchangeably with mitigation. Commitments are Embedded Mitigation Measures. Commitments are either Primary (Design) or Tertiary (Inherent) and embedded within the assessment at the relevant point in the EIA (e.g. at Scoping or PEIR). The purpose of Commitments is to reduce and/or eliminate Likely Significant Effects (LSE's), in EIA terms.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Projects (NSIP).
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
EIA Regulations	The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations').
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA Regulations, including the publication of an Environmental Statement.
Environmental Statement (ES)	A document reporting the findings of the EIA and produced in accordance with the EIA Directive as transposed into UK law by the EIA Regulations.
Habitats Regulations Assessment (HRA)	A process which helps determine likely significant effects and (where appropriate) assesses adverse impacts on the integrity of European conservation sites and Ramsar sites. The process consists of up to four stages of assessment: screening, appropriate assessment, assessment of alternative solutions and assessment of imperative reasons of over-riding public interest (IROPI).
Maximum design scenario	The maximum design parameters of each Hornsea Four asset (both on and offshore) considered to be a worst case for any given assessment.
Mitigation	A term used interchangeably with Commitment(s) by Hornsea Four. Mitigation measures (Commitments) are embedded within the assessment at the relevant point in the EIA (e.g. at Scoping or PEIR).
Orsted Hornsea Project Four Ltd.	The Applicant for the Hornsea Project Four offshore wind farm.
Planning Inspectorate (PINS)	The agency responsible for operating the planning process for Nationally Significant Infrastructure Projects (NSIPs).
Primary mitigation	Design decisions taken by the project which affect EIA (e.g. no development within 50 m of residential property). Primary mitigation is embedded into the

Term	Definition
	design of Hornsea Four and should be considered in the pre-mitigation assessment.
Secondary mitigation	Mitigation to reduce impacts to acceptable levels. Secondary mitigation measures are developed and considered to be additional, and typically require additional action post-consent to be implemented. These are only considered in the residual effects assessment (if secondary mitigation is required).
Statutory consultee	Organisations that are required to be consulted by the Local Planning Authorities and/or PINs, and who also have with a duty to respond to that consultation within a set deadline. This includes consultees that the Applicant is required to consult with, under Section 42 of the Planning Act 2008. Not all consultees will be statutory consultees (see non-statutory consultee definition below).
Tertiary mitigation	Best practice mitigation that would need to be implemented with or without the EIA. These mitigation measures have a certainty of being implemented and should be considered in the pre-mitigation assessment. This includes plans such as Code of Construction Practice, Construction Logistics Plans, etc.

Acronyms

Acronym	Definition
AONB	Areas of Outstanding Natural Beauty
BAP	Biodiversity Action Plan
BoCC	Birds of Conservation Concern
BCT	Bat Conservation Trust
BS	British Standards
CEA	Cumulative Affect Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CIRIA	Construction Industry Research and Information Association
CoCP	Code of Construction Practice
CRoW	Countryside and Rights of Way Act
DCO	Development Consent Order
eDNA	Environmental DNA
EcIA	Ecological Impact Assessment
EBI	Energy Balancing Infrastructure
ECoW	Ecological Clerk of Works
ECC	Export Cable Corridor
eDNA	Environmental DNA
EEC	European Economic Community
EEA	European Economic Area

EIA	Environmental Impact Assessment
EP1HS	Extended Phase 1 Habitat Survey
ERYC	East Riding of Yorkshire Council
ES	Environmental Statement
EU	European Union
GB	Great Britain
HDD	Horizontal Directional Drilling
HSI	Habitat Suitability Index
IAQM	Institute of Air Quality Management
IMEA	Institute of Environmental Assessment
IPC	Infrastructure Planning Commission
IRZ	Impact Risk Zones
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
LNR	Local Nature Reserve
LWS	Local Wildlife Site
MDS	Maximum Design Scenarios
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
NE	Natural England
NERC	Natural Environment and Rural Communities
NEYEDC	North and East Yorkshire Ecological Data Centre
NNR	National Nature Reserve
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
OnSS	Onshore Substation
OS	Ordnance Survey
RSPB	Royal Society for the Protection of Birds
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
RSPB	Royal Society for the Protection of Birds
SAC	Special Areas of Conservation
SoS	Secretary of State
SPA	Special Protection Areas
SSSI	Site of Special Scientific Interest
TN	Target Notes
TP	Technical Panel
TPO	Tree Preservation Orders
UKHPI	UK Habitats of Principal Importance
VP	Vantage Point

Units

Unit	Definition
GW	Gigawatt (power)
ha	Hectares
kV	Kilovolt (electrical potential)
kW	Kilowatt (power)
m	Metres

3.1 Introduction

3.1.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents an assessment to date of the potential impacts of the Hornsea Project Four offshore wind farm (hereafter Hornsea Four) on ecology and nature conservation. Specifically, this chapter considers the potential impact of Hornsea Four landward of Mean High Water Springs (MHWS) during its construction, operation and maintenance, and decommissioning phases.

3.1.1.2 Orsted Hornsea Project Four Limited (the Applicant) is proposing to develop Hornsea Four. Hornsea Four will include both offshore and onshore infrastructure including an offshore generating station (wind farm), export cables to landfall, and connection to the electricity transmission network and National Grid substation at Creyke Beck (please see [Volume 1, Chapter 4: Project Description](#) for full details on the Project Design).

3.1.1.3 This chapter summarises information contained within the following technical reports, which are included in [Volume 6](#).

- [Volume 6, Annex 3.1: Extended Phase 1 Habitat Survey Report](#);
- [Volume 6, Annex 3.2: Onshore Ornithology – Wintering and Migratory Birds Survey Report](#);
- [Volume 6, Annex 3.4: Great Crested Newt Survey Report](#); and
- [Volume 6, Annex 3.10: Badger Survey Report](#)

3.1.1.4 At the time of compiling this PEIR, the following ecological surveys are ongoing and as such the findings of which are not summarised or reported within this PEIR chapter. However, the results from these surveys will be available for inclusion in the Hornsea Four Environmental Statement (ES), and therefore they will be provided at that time. This approach was agreed with Natural England, the Yorkshire Wildlife Trust (YWT), East Riding of Yorkshire Council (ERYC), and the Royal Society for the Protection of Birds (RSPB) at an Ecology Technical Panel Meeting on 8th April 2019, and the following reports will be provided in the ES:

- [Volume 6, Annex 3.3: Breeding Bird Survey Report](#);
- [Volume 6, Annex 3.5: Water vole Survey Report](#);
- [Volume 6, Annex 3.7: Otter Survey Report](#); and
- [Volume 6, Annex 3.8: Bat Survey Report](#).

3.1.1.5 It was also agreed at the Ecology Technical Panel Meeting, held in April 2019, that no impact assessment would be undertaken in the PEIR for those species where surveys are still being undertaken.

3.2 Purpose

3.2.1.1 This PEIR presents the preliminary environmental information for Hornsea Four and sets out the findings of the Environmental Impact Assessment (EIA) to date to support the pre-

Development Consent Order (DCO) application consultation activities required under the Planning Act 2008.

3.2.1.2 The feedback from this consultation will be used to inform the final project design where appropriate and the associated EIA (which will be reported in an ES) that will accompany the DCO application made to the Secretary of State, which will be submitted to the Planning Inspectorate (PINS).

3.2.1.3 This PEIR chapter:

- Presents the existing environmental baseline established from desk studies, and consultation;
- Presents the potential environmental effects on Ecology and Nature Conservation arising from Hornsea Four, based on the information gathered and the analysis and assessments undertaken to date;
- Identifies any assumptions and limitations encountered in compiling the environmental information; and
- Highlights any necessary monitoring and/or mitigation measures which could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process.

3.3 Planning and Policy Context

3.3.1. National Policy Statement (NPS)

3.3.1.1 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; DECC, 2011a) and the NPS for Renewable Energy Infrastructure (EN-3, DECC, 2011b).

3.3.1.2 NPS EN-1 and NPS EN-3 includes guidance on what matters are to be considered in the assessment. These are summarised in [Table 3.1](#).

Table 3.1: Summary of NPS EN-1 and EN3 provisions relevance to ecology and nature conservation.

Summary of NPS EN-1 and EN-3 provisions	How and where considered in the PEIR
<p>Prior to granting a development consent order, the IPC (hereafter referred to as Secretary of State) must, under the Habitats and Species Regulations, (which implement the relevant parts of the Habitats Directive and the Birds Directive in England and Wales) consider whether the project may have a significant effect on a European site, or on any site to which the same protection is applied as a matter of policy, either alone or in combination with other plans or projects.</p>	<p>Hornsea Four are submitting a Report to Inform Appropriate Assessment (RIAA) and a full Habitats Regulations Assessment (HRA) as part of the Projects' DCO application. This is reported separately to this ecology and nature conservation PEIR chapter.</p>

Summary of NPS EN-1 and EN-3 provisions	How and where considered in the PEIR
<p>(EN-1, paragraph 4.3.1)</p> <p>Where the development is subject to EIA [Environmental Impact Assessment] the applicant should ensure that the ES [Environmental Statement] clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity. The applicant should provide environmental information proportionate to the infrastructure where EIA is not required to help the Secretary of State consider thoroughly the potential effects of a proposed project. (EN-1, paragraph 5.3.3)</p>	<p>Existing environment is set out in Section 3.7</p> <p>An assessment on designated sites is set out in Section 3.10.</p> <p>Any effects on protected species and other species identified as being of principal importance for the conservation of biodiversity will be provided with the ES as part of the Hornsea Four DCO application.</p>
<p>The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests. (EN-1, paragraph 5.3.4)</p>	<p>Hornsea Four has committed to a suite of embedded mitigation measures to conserve and enhance biodiversity including the avoidance of sensitive sites (where practical) (Co2) through a robust Route and Site Selection Process (RPSS) (Volume 1, Chapter 3: Site Selection and Consideration of Alternatives). Other commitments of relevance are summarised in Table 3.12.</p>
<p>As a general principle, and subject to the specific policies below, development should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives (as set out in Section 4.4 above); where significant harm cannot be avoided, then appropriate compensation measures should be sought.' (EN-1, paragraph 5.3.7)</p>	<p>Hornsea Four has committed to the avoidance of sensitive sites (where practical) (Co2) through a robust Route and Site Selection Process (RPSS) (Volume 1, Chapter 3: Site Selection and Consideration of Alternatives), alongside commitments to the crossing of main watercourses by horizontal directional drilling (HDD) methods (Co1) and the avoidance of ponds through micro-siting during the detailed design process (Co78). Hornsea Four has also committed to undertaking a hydrogeological risk assessment to inform site specific crossing method statements for particularly sensitive sites such as Sites of Special Scientific Interest (SSSIs) (Co18).</p> <p>Full details on these commitments are presented in Table 3.12.</p>
<p>Many SSSIs are also designated as sites of international importance and will be protected accordingly. Those that are not, or those features of SSSIs not covered by an international designation, should be given a high degree of protection. All</p>	<p>Hornsea Four has avoided sensitive and protected sites (where practical) through the RPSS process (Volume 1, Chapter 3: Site Selection and Consideration of Alternatives). Where unavoidable (River Hull Headwaters SSSI), Hornsea</p>

Summary of NPS EN-1 and EN-3 provisions	How and where considered in the PEIR
<p>National Nature Reserves are notified as SSSIs. (EN-1, paragraph 5.3.10)</p>	<p>Four have committed to the use of HDD methodologies (Co1), as well as undertaking a hydrogeological risk assessment to inform site specific crossing method statements for particularly sensitive sites such SSSIs (Co18).</p> <p>Designated sites are further discussed in Section 3.7 and the impact assessment is set out in Section 3.10.</p>
<p>The applicant should include appropriate mitigation measures as an integral part of the proposed development. In particular, the applicant should demonstrate that:</p> <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. (EN-1, paragraph 5.3.18) 	<p>Hornsea Four has committed to adhere to the projects' Outline Code of Construction Practice (CoCP) (Co124) (Volume F2, Chapter 2), Outline Ecological Management Plan (OEMP) (Co168) (Volume F2, Chapter 3) and Site Waste Management Plan (SWMP) (Co65) to prevent and control spillage of harmful material and ensure any damage to protected species or habitats is minimised.</p> <p>Further details on embedded mitigation measures are presented in Section 3.8.2</p>
<p>Proposals for renewable energy infrastructure should demonstrate good design in respect of landscape and visual amenity, and in the design of the project to mitigate impacts such as noise and effects on ecology. (EN-3, paragraph 2.4.2)</p>	<p>Project design has avoided sensitive features where possible (Co2). In addition, Volume 4, Annex 4.6: Outline Design Vision Statement incorporates findings from the baseline data that has been obtained to date and will be used to inform the detailed design of the onshore substation (OnSS).</p> <p>Further details on project commitments are presented in Table 3.12.</p>
<p>Ecological monitoring is likely to be appropriate during the construction and operational phases to identify the actual impact so that, where appropriate, adverse effects can then be mitigated and to enable further useful information to be published relevant to future projects. (EN-3, paragraph 2.6.71)</p>	<p>The requirement to undertake ecological monitoring during construction and operation will be determined upon completion of baseline data collection and the assessment process. This will be agreed with stakeholders and detailed in the ES submitted to support the DCO. An Outline Ecological Management Plan (OEMP) (Co168)</p>

Summary of NPS EN-1 and EN-3 provisions	How and where considered in the PEIR
	(Volume F2, Chapter 3) has been provided with high levels details, and which will be developed in consultation with stakeholders.
There may be some instances where it would be more harmful to the ecology of the site to remove elements of the development, such as the access tracks or underground cabling, than to retain them.(EN-3, paragraph 2.7.15)	Current plans for the decommissioning of Hornsea Four is in line with NPS EN-3 and includes leaving the underground cable in situ (securely) alongside the removal of any above ground electrical equipment and buildings. Further details on decommissioning can be found in Volume 1, Chapter 4: Project Description .

3.3.1.3 NPS EN-1 and NPS EN-3 also highlight several factors relating to the determination of an application and in relation to mitigation. These are summarised in [Table 3.2](#).

Table 3.2: Summary of NPS EN-1 and EN-3 policy on decision making relevant to ecology and nature conservation.

NPS Requirement	PEIR Reference
In having regard to the aim of the Government’s biodiversity strategy the Secretary of State should take account of the context of the challenge of climate change: failure to address this challenge will result in significant adverse impacts to biodiversity. The policy set out in the following sections recognises the need to protect the most important biodiversity and geological conservation interests. The benefits of nationally significant low carbon energy infrastructure development may include benefits for biodiversity and geological conservation interests and these benefits may outweigh harm to these interests. The IPC may take account of any such net benefit in cases where it can be demonstrated. (EN-1, paragraph 5.3.6)	Hornsea Four has committed to the avoidance of features of sensitive sites interest (where practical) through a robust RPSS process (Co2) (Volume 1, Chapter 3: Site Selection and Consideration of Alternatives), alongside commitments to the crossing of main watercourses by horizontal directional drilling (HDD) methods (Co1) and the avoidance of ponds through micro-siting during the detailed design process (Co78). Full details on these commitments are presented in Table 3.12 . Consideration of climate change is included in the future baseline, presented in Section 3.7.6 .
In taking decisions, the Secretary of State should ensure that appropriate weight is attached to designated sites of international, national and local importance; protected species; habitats and other species of principal importance for the conservation of biodiversity; and to biodiversity and geological interests within the wider environment. (EN-1, paragraph 5.3.8)	Designated sites are discussed in Section 3.7 Assessment is set out in Section 3.10 .
For the purposes of considering development proposals affecting them, as a matter of policy the Government wishes SPAs to be considered in the same way as if they had already been classified. Listed	Hornsea Four has committed to the avoidance of features of sensitive sites interest (where practical) through a robust RPSS process (Co2) (Volume 1,

NPS Requirement	PEIR Reference
<p>Ramsar sites should, also as a matter of policy receive the same protection (EN-1, paragraph 5.3.9)</p>	<p>Chapter 3: Site Selection and Consideration of Alternatives).</p> <p>Further information on commitments are presented in Table 3.12.</p> <p>Information on offshore sensitive sites is to be provided separately within the RIAA and HRA</p>
<p>Where a proposed development on land within or outside an SSSI is likely to have an adverse effect on an SSSI (either individually or in combination with other developments), development consent should not normally be granted.</p> <p>Where an adverse effect, after mitigation, on the site's notified special interest features are likely, an exception should only be made where the benefits (including need) of the development at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of SSSIs. The Secretary of State should use requirements and/or planning obligations to mitigate the harmful aspects of the development and, where possible, to ensure the conservation and enhancement of the site's biodiversity or geological interest. (EN-1, paragraph 5.3.10)</p>	<p>Hornsea Four has avoided sensitive and protected sites (where practical) through the RPSS process (Co2) (Volume 1, Chapter 3: Site Selection and Consideration of Alternatives). Where unavoidable (River Hull Headwaters SSSI), Hornsea Four have committed to the use of HDD methodologies (Co1), with sensitive placement of HDD entry/exit pits outside the riparian vegetation associated with the SSSI (Co18).</p> <p>Designated sites are further discussed in Section 3.7 and the impact assessment is set out in Section 3.10.</p>
<p>Sites of regional and local biodiversity and geological interest, which include Regionally Important Geological Sites, Local Nature Reserves and Local Sites have a fundamental role to play in meeting overall national biodiversity targets; contributing to the quality of life and the well-being of the community; and in supporting research and education. The Secretary of State should give due consideration to such regional or local designations. However, given the need for new infrastructure, these designations should not be used in themselves to refuse development consent. (EN-1, paragraph 5.3.13)</p>	<p>Hornsea Four has avoided sensitive and protected sites (where practical) through the RPSS process (Co2) (Volume 1, Chapter 3: Site Selection and Consideration of Alternatives). Where unavoidable (Bryan Mills Beck LWS, Beale's Beck, Lockington LWS, Raventhorpe Embankment LWS, Newbald Road LWS, Moor Lane LWS and Jillywood Lane LWS), Hornsea Four will undertake consultation with relevant stakeholders in regard to sensitive crossing measures to avoid adverse impacts to these locally sensitive sites.</p> <p>Furthermore, Hornsea Four has committed to adherence to the Projects' Outline CoCP (Co124), Outline EMP (Co168) and Site Waste Management Plan (SWMP) (Co65) to avoid potential contamination.</p>

NPS Requirement	PEIR Reference
	<p>Further information on these commitments are presented in Table 3.12.</p> <p>Designated sites are further discussed in Section 3.7 and the impact assessment is set out in Section 3.10.</p>
<p>Ancient woodland is a valuable biodiversity resource both for its diversity of species and for its longevity as woodland. Once lost it cannot be recreated.</p> <p>The Secretary of State should not grant development consent for any development that would result in its loss or deterioration unless the benefits (including need) of the development, in that location outweigh the loss of the woodland habitat. Aged or 'veteran' trees found outside ancient woodland are also particularly valuable for biodiversity and their loss should be avoided.</p> <p>Where such trees would be affected by development proposals the applicant should set out proposals for their conservation or, where their loss is unavoidable, the reasons why. (EN-1, paragraph 5.3.14)</p>	<p>Hornsea Four has avoided sensitive and protected sites (where practical) through the RPSS process (Co2) (Volume 1, Chapter 3: Site Selection and Consideration of Alternatives). This includes areas of woodland alongside aged or 'veteran' trees that may be particularly valuable for biodiversity.</p> <p>Existing environment is set out in Section 3.7</p> <p>Further information on these commitments are presented in Section 3.8.2</p>
<p>Development proposals provide many opportunities for building-in beneficial biodiversity or geological features as part of good design. When considering proposals, the Secretary of State should maximise such opportunities in and around developments, using requirements or planning obligations where appropriate. (EN-1, paragraph 5.3.15)</p>	<p>Project design has avoided sensitive features where possible (Co2). In addition, Volume 4, Annex 4.6: Outline Design Vision Statement incorporates the findings from the baseline data that has been gathered to date to inform the final designs of the OnSS.</p>
<p>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 it considers may result from a proposed development. (EN-1, paragraph 5.3.17)</p>	<p>Hornsea Four has avoided sensitive and protected sites (where practical) through the RPSS process (Co2) (Volume 1, Chapter 3: Site Selection and Consideration of Alternatives). This includes areas of woodland alongside aged or 'veteran' trees that may be particularly valuable for biodiversity.</p> <p>Existing environment is set out in Section 3.7</p> <p>Further information on these commitments are presented in Section 3.8.2</p>

NPS Requirement	PEIR Reference
<p>Where the applicant cannot demonstrate that appropriate mitigation measures will be put in place the Secretary of State should consider what appropriate requirements should be attached to any consent and/or planning obligations entered into. (EN-1, paragraph 5.3.19)</p>	<p>Primary, tertiary and secondary mitigation measures are presented in Table 3.12, with the requirement for additional mitigation outlined in Section 3.10.</p>
<p>The Secretary of State will need to take account of what mitigation measures may have been agreed between the applicant and Natural England (or the Countryside Council for Wales) or the Marine Management Organisation (MMO), and whether Natural England (or the Countryside Council for Wales) or the MMO has granted or refused or intends to grant or refuse, any relevant licences, including protected species mitigation licences. (EN-1, paragraph 5.3.20)</p>	<p>Primary, tertiary and secondary mitigation measures are presented in Table 3.12, with the requirement for additional mitigation outlined in Section 3.10.</p>
<p>In sites with nationally recognised designations (Sites of Special Scientific Interest, National Nature Reserves, National Parks, the Broads, Areas of Outstanding Natural Beauty and Registered Parks and Gardens), consent for renewable energy projects should only be granted where it can be demonstrated that the objectives of designation of the area will not be compromised by the development, and any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by the environmental, social and economic benefits.’ (EN-3, paragraph 2.5.33)</p>	<p>Hornsea Four has avoided sensitive and protected sites (where practical) through the RPSS process (Co2) (Volume 1, Chapter 3: Site Selection and Consideration of Alternatives). Where unavoidable (River Hull Headwaters SSSI), Hornsea Four have committed to the use of HDD methodologies (Co1), with sensitive placement of HDD entry/exit pits outside the riparian vegetation associated with the SSSI (Co18).</p> <p>Designated sites are discussed in Section 3.7 Assessment is set out in Section 3.10.</p>

3.3.2. National Planning Policy Framework

- 3.3.2.1 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, updated 2019) is the primary source of national planning guidance in England. Whilst the NPPF is not directly applicable to NSIPs, as Government policy it may be considered relevant and important.
- 3.3.2.2 Paragraph 8 of the NPPF states that there are three dimensions to sustainable development: economic, social and environmental, and that all three are mutually dependent and gains for all should be sought jointly and simultaneously through the planning system.
- 3.3.2.3 The environmental dimension is defined as “an environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently,

minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."

3.3.3. Natural Environment White Paper (2011)

3.3.3.1 The paper was the first White Paper produced by the government in 20 years. The paper contains plans to reconnect nature, connect people and nature for better quality of life and capture and improve the value of nature.

3.3.4. Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services

3.3.4.1 The Strategy sets out how England will implement the 2010 Aichi Biodiversity Targets, the European Commission's 2011 EU Biodiversity Strategy and the recommendations of the 2011 Natural Environment White Paper. It contains the following relevant targets:

- Better wildlife habitats with 90% of priority habitats in favourable or recovering condition and at least 50% of SSSIs in favourable condition, while maintaining at least 95% in favourable or recovering condition;
- More, bigger and less fragmented areas for wildlife, with no net loss of priority habitat and an increase in the overall extent of priority habitats by at least 200,000 ha;
- By 2020, at least 17% of land and inland water in England, especially areas of importance for biodiversity and ecosystem services, conserved through effective, integrated and joined up approaches to safeguard biodiversity and ecosystem services including through management of our existing systems of protected areas and the establishment of nature improvement areas;
- Restoring at least 15% of degraded ecosystems as a contribution to climate change mitigation and adaptation;
- By 2020, we will see an overall improvement in the status of our wildlife and will have prevented further human-induced extinctions of known threatened species; and
- By 2020, significantly more people will be engaged in biodiversity issues, aware of its value and taking positive action.

3.3.5. Local Planning Policy

3.3.5.1 NPS EN-1 states, in paragraph 4.1.5 that "Other matters that the IPC [now the Secretary of State] may consider important and relevant to its decision-making may include Development Plan Documents or other documents in the Local Development Framework. In the event of a conflict between these or any other documents and an NPS, the NPS prevails for the purposes of IPC decision making given the national significance of the infrastructure."

3.3.5.2 The onshore Hornsea Four boundaries fall within the jurisdiction of ERYC.

3.3.5.3 ERYC planning policy relevant to Hornsea Four states that the local authority is "committed to the creation and maintenance of maintenance of a sustainable built and natural environment through appropriate planning and development management measures."

3.3.6. Legislation

3.3.6.1 **Table 3.3** provides detail on key pieces of International and UK legislation which are relevant to Ecology and Nature Conservation.

3.3.6.2 Further overarching information on legislation is provided in **Volume 1, Chapter 2: Planning and Policy Context**.

Table 3.3: Key International and UK legislation relevant to ecology and nature conservation.

Legislation	Relevance
The Conservation of Habitats and Species Regulations 2017 (or 'The Habitats Regulations 2017') (Conservation of Habitats and Species Regulations, 2017)	<p>These Regulations provide protection for specific habitats listed in Annex I and species listed in Annex II of the Habitats Directive. The Directive sets out decision making procedures for the protection of Special Areas of Conservation (SAC) and Special Protection Areas (SPA), implemented in the UK through The Conservation of Habitats and Species Regulations 2017.</p> <p>The Regulations make it an offence (subject to exceptions) to deliberately capture, injure, kill, disturb, or trade in the animals listed in Schedule 2, or pick, collect, cut, uproot, destroy, or trade in the plants listed in Schedule 4.</p> <p>The Regulations require competent authorities to consider or review planning permission, applied for or granted, affecting a European site, and, subject to certain exceptions, restrict or revoke permission where the integrity of the site would be adversely affected.</p>
Wildlife and Countryside Act 1981 (as amended) (WCA, 1981)	<p>This Act makes it an offence (subject to certain exceptions) to intentionally: kill, injure, or take any wild bird; take, damage or destroy the nest of any wild bird while that nest is in use or being built; and take or destroy an egg of any wild bird.</p> <p>The Act makes it an offence to intentionally kill, injure or take any animal listed in Schedule 5 of the act and protects occupied and unoccupied places used for shelter or protection by such animals.</p> <p>The Act makes it an offence (subject to exceptions) to intentionally pick, uproot or destroy any wild plant listed in Schedule 8 of the Act.</p> <p>The Act makes it an offence to plant or otherwise cause to grow any non-native, invasive species listed under Part 2 of Schedule 9 of the Act.</p> <p>The Act makes provision for the notification and confirmation of Sites of Special Scientific Interest (SSSI).</p>
The Protection of Badgers Act 1992 (Protection of Badgers Act, 1992)	<p>The Act makes it an offence to wilfully kill, injure or take, or attempt to kill, injure or take a badger <i>Meles meles</i>; and to cruelly ill-treat a badger.</p> <p>The Act makes it an offence to intentionally or recklessly damage, destroy or obstruct a badger sett, or to disturb a badger whilst in a sett.</p>

Legislation	Relevance
Natural Environment and Rural Communities (NERC) Act 2006 (NERC, 2006)	Section 41 of the Act requires the Secretary of State (SoS) to compile a list of habitats and species of principal importance for the conservation of biodiversity in England (herein 'S41 species'). Decision makers of public bodies, in the execution of their duties, must have regard to the conservation of biodiversity in England, and the list is intended to guide them.
The Hedgerow Regulations 1997 (Hedgerow Regulations, 1997)	The Regulations make it an offence to remove or destroy certain hedgerows without permission from the local planning authority and the local planning authority is the enforcement body for such offences.
Countryside and Rights of Way Act (CRoW)2000 (CRoW, 2000)	The Act amends the law relating to public rights of way including making provision for public access on foot to certain types of land. Amendments are made in relation to SSSIs to improve their management and protection, as well as to the Wildlife and Countryside Act 1981, to strengthen the legal protection for threatened species.

3.3.7. Guidance

3.3.7.1 The impact assessment has been based upon the following guidance and standards:

- Chartered Institute of Ecology and Environmental Management (CIEEM) (CIEEM, 2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal;
- British Standard 42020:2013 – Biodiversity. Code of Practice for planning and development;
- Construction Industry Research and Information Association (CIRIA) C648 (2006) Control of water pollution from linear construction projects (CIRIA, 2006); and
- CIRIA Guidance note C692 Environmental Good Practice on Site Guide (3rd Edition – CIRIA, 2010).

3.3.7.2 The following species-specific guidance and standards have been used during the assessment process:

- Standing advice on protected species (bats (all species), great crested newts *Triturus cristatus*, badgers, water voles *Arvicola amphibius*, otters *Lutra lutra*, reptiles, protected plants, invertebrates, white-clawed crayfish *Austropotamobius pallipes*, ancient woodlands and veteran trees) (Natural England, 2015);
- British Standard 5837: 2012 – Trees in relation to design, demolition and construction;
- Bat Conservation Trust and Institute of Lighting Engineers (2018) Bats and Artificial Lighting in the UK (ILE, 2018);
- The Water Vole Mitigation Handbook (The Mammal Society Guidance Series) (Dean et al, 2016);
- Reptile Habitat Management Handbook (Edgar et al, 2010);
- Great Crested Newt Mitigation Guidelines (English Nature, 2001);
- Herpetofauna Worker's Manual (Joint Nature Conservation Committee (JNCC), 2003);

- Otters: surveys and mitigation for development projects. Natural England Standing Advice (Natural England, 2014);
- Badgers: surveys and mitigation for development projects. Natural England Standing Advice (Natural England, 2015);
- Bats: surveys and mitigation for development projects. Natural England Standing Advice (Natural England, 2015);
- Great crested newts: surveys and mitigation for development projects. Natural England Standing Advice (Natural England, 2015);
- Invertebrates: surveys and mitigation for development projects. Natural England Standing Advice (Natural England, 2015);
- Reptiles: surveys and mitigation for development projects. Natural England Standing Advice (Natural England, 2015);
- Water voles: surveys and mitigation for development projects. Natural England Standing Advice (Natural England, 2015);
- Water Vole Conservation Handbook, 3rd Edition (Strachan and Moorhouse, 2011); and
- Great Britain (GB) Non-native Species Information (GB Non-native secretariat, 2015).

3.4 Consultation

- 3.4.1.1 Consultation is a key part of the DCO application process. Consultation regarding Ecology and Nature Conservation has been conducted through Hornsea Four Evidence Plan Meetings, the Scoping Report (Ørsted, 2018) and consultation on the draft HRA report. An overview of the project consultation process is presented within [Volume 1, Chapter 6: Consultation](#).
- 3.4.1.2 A summary of the key issues raised during consultation specific to Ecology and Nature Conservation is outlined below in [Table 3.4](#), together with how these issues have been considered in the production of this PEIR. A summary of consultation specific to Ecology and Nature Conservation undertaken for the former Hornsea Zone, which are applicable to Hornsea Four, are also set out below.

Table 3.4: Consultation Responses received to date.

Consultee	Date, Document, Forum	Comment	Where addressed in the PEIR
Natural England	23 November 2018, Scoping Opinion	<p>Internationally designated sites</p> <p>The onshore scoping document does not include reference to internationally designated sites (Ramsar, SAC, SPA). NE advises that sites of international importance are scoped into the assessment in order to allow consideration of alone and in-combination effects. In particular the Greater Wash SPA, which overlaps with the potential landfall corridor, should be within the scope</p>	Existing environment in relation to internationally designated sites is set out in Section 3.7 , and an impact assessment is set out in Section 3.10 .
Forestry Commission	23 November 2018, Scoping Opinion	<p>Data sources</p> <p>We recommend the inclusion of the National Forest Inventory in this mapping: National Forest Inventory - Forest Research. There does appear to be some woodland related Countryside Stewardship grant-funded activity across the project area, we would like to understand all woodland related impact within the possible project footprint.</p>	Data sources used to inform the ecology and nature conservation impact assessment, including the use of National Forest Inventory are presented in Section 3.6 and Section 3.7
PINS	23 November 2018, Scoping Opinion	<p>Direct impacts on designated sites:</p> <p>Construction phase</p> <p>The Inspectorate notes the caveat of 'where technically practical' in Co1 regarding trenchless techniques and 'where practical/possible' and 'permanent project footprint' in Co2, the commitments on which the scoping assessment is based. The Inspectorate also notes the information on Figures 7.7 and 7.8 which indicates a number of designated sites within the vicinity or overlapping the indicative cable route. It is also acknowledged in the Scoping Report that the Proposed Development will be subject to further refinements, including to the cable route and location of the landfall and substation.</p>	<p>Updated wording in relation to Co1 and Co2 has been provided in Table 3.12</p> <p>Designated sites are discussed in Section 3.7, and an assessment is set out in Section 3.10.</p>

Consultee	Date, Document, Forum	Comment	Where addressed in the PEIR
		<p>It is not clear if the impacts of temporary construction areas are considered against the embedded mitigation. It is also not clear if the word 'degradation' in Table 7.10 includes effects that can arise from indirect impacts, e.g. hydrological changes elsewhere. Uncertainty therefore remains as to the successful avoidance of impacts on designated sites. The Inspectorate considers that a risk of significant effects exists and that this matter should be assessed in the ES. The Inspectorate advises that all potential impacts on designated sites, both direct and indirect, should be assessed in the ES.</p>	
PINS	23 November 2018, Scoping Opinion	<p>Impacts on white clawed crayfish and fish: Construction phase</p> <p>Given the information regarding baseline conditions regarding white clawed crayfish and their likely absence from the study area, the Inspectorate agrees that significant effects are unlikely, and the Inspectorate agrees that this species can be scoped out of the ES.</p> <p>The assumption that the embedded mitigation measures proposed will avoid impacts on fish is undermined by the uncertainties remaining about the implementation and effectiveness of the mitigation. No baseline data for freshwater fish, including species of conservation interest, is presented in the scoping report. The Inspectorate cannot agree to scope this matter out of the ES and advises that impacts on watercourses should be assessed where significant effects on freshwater fish could occur.</p>	<p>Potential impacts and mitigation measures regarding fish (including migratory lamprey) that will be adhered to by Hornsea Four are included within Section 3.7 and further discussed in Volume 1, Chapter 2: Hydrology and Flood Risk</p> <p>Embedded mitigation measures are presented in Section 3.8.2</p>
PINS	23 November 2018, Scoping Opinion	<p>Internationally designated sites</p> <p>The study area applied to the designated site search should be coordinated with the approach used in the proposed Habitats Regulations Screening Report in the case of internationally designated sites (terrestrial,</p>	<p>All designated sites study areas were discussed and agreed with stakeholders during the Evidence Plan process and are described in Section 3.5. Further discussion on designated sites is included in Section 3.7. The 2</p>

Consultee	Date, Document, Forum	Comment	Where addressed in the PEIR
		<p>and coastal/marine in the appropriate ES chapters), and effort should be made to agree with relevant consultation bodies.</p> <p>The ES should assess impacts to internationally designated sites where significant effects are likely.</p>	<p>km study area used for designated sites in this Chapter is consistent with the study area used to inform the Hornsea Four Report to Inform Appropriate Assessment (RIAA), submitted separately to the ecology and nature conservation PEIR chapter.</p> <p>Assessment related to designated sites is set out in Section 3.10.</p>
PINS	23 November 2018, Scoping Opinion	<p>Further baseline data requirements/ route planning and site selection (RPSS) -</p> <p>The Inspectorate would expect the habitat surveys undertaken to be fully reported in the ES. It is understood that this information will inform refinements to the RPSS and the Inspectorate advises that this process take into account irreplaceable habitats such as Ancient Woodland and Veteran Trees.</p>	<p>Hornsea Four has avoided sensitive and protected sites (where practical) (Co2) through the RPSS and micro-siting to avoid unprotected woodland, mature, and protected trees during the detailed design process (where practical) (Co2). This includes areas of woodland alongside aged or 'veteran' trees that may be particularly valuable for biodiversity.</p> <p>Existing environment is set out in Section 3.7</p> <p>Further information on these commitments are presented in Section 3.8.2</p> <p>Full baseline information on protected species is to be completed and submitted in the Hornsea Four ES, in agreement with stakeholders and as presented in Section 3.1</p>
Forestry Commission	23 November 2018, Scoping Opinion	We do note that in reference to Ancient Woodland in this section the scoping report only refers to: "Where practical the following sensitive sites (inclusive of Ancient Woodland)	Hornsea Four has avoided sensitive and protected sites (where practical) (Co2) through the RPSS and micro-siting to

Consultee	Date, Document, Forum	Comment	Where addressed in the PEIR
		<p>will be avoided by the permanent project footprint" without specific reference to mitigation or compensation for potential impact on ancient woodland. Also, throughout the scoping report there appears to be no mention of Ancient Woodland or Veteran Trees being "Irreplaceable Habitats" as per the National Planning Policy Framework. If there isn't any ancient woodland impacted, we would expect this to be referenced.</p> <p>Figure 4.3 – Shows Ancient Woodland but no other woodland we would like to see all woodland assessed for value and impact, and to be considered within mitigation/compensation provisions to avoid net deforestation of the project.</p>	<p>avoid unprotected woodland, mature, and protected trees during the detailed design process (where practical) (Co2). This includes areas of woodland alongside aged or 'veteran' trees that may be particularly valuable for biodiversity.</p> <p>All UK Habitats of Principal Importance, including the National Forestry Commission dataset are shown on Figure 3.11 to Figure 3.15.</p> <p>Existing environment is set out in Section 3.7</p> <p>Further information on these commitments are presented in Section 3.8.2</p>
Natural England	23 November 2018, Scoping Opinion	<p>General</p> <p>Co2 Primary: Where practical the following sensitive sites will be avoided by the permanent project footprint: SSSI Units (dependent upon condition), Ancient woodland, areas of consented development, areas of historic landfill and other known areas of potential contamination'.</p> <p>Sites should be avoided by the permanent and the temporary construction footprint, where possible. Natural England also advise that the temporary footprint of the project should also avoid impacts to designated sites wherever possible."</p>	<p>Hornsea Four has avoided sensitive and protected sites (where practical) (Co2) through the RPSS and micro-siting to avoid unprotected woodland, mature, and protected trees during the detailed design process (where practical) (Co2).</p> <p>Where statutory designated sites were unavoidable (River Hull Headwaters SSSI), Hornsea Four have committed to the use of HDD methodologies (Co1), with sensitive placement of HDD entry/exit pits outside the riparian vegetation associated with the SSSI (Co18).</p> <p>Where non-statutory designated sites were</p>

Consultee	Date, Document, Forum	Comment	Where addressed in the PEIR
			<p>unavoidable (Bryan Mills Beck LWS, Beale's Beck, Lockington LWS, Raventhorpe Embankment LWS, Newbald Road LWS, Moor Lane LWS and Jillywood Lane LWS), Hornsea Four will undertake consultation with relevant stakeholders in regard to sensitive crossing measures to avoid adverse impacts to these locally sensitive sites.</p> <p>Further information on these commitments are presented in Table 3.12</p> <p>Designated sites are further discussed in Section 3.7 and the impact assessment is set out in Section 3.10.</p>
Natural England	23 November 2018, Scoping Opinion	<p>We note that the study area has been delineated by a 2km buffer around the indicative landfall area, cable route and substation search area. NE advise that the buffer should incorporate Impact Risk Zones (IRZ) for SSSIs.</p> <p>We would advise that the buffer is extended in order to include Internationally designated sites which may be affected by alone and in combination impacts.</p>	<p>The study areas implemented with respect to Hornsea Four are presented in Section 3.5.</p> <p>Consideration of Impact Risk Zones is discussed in Section 3.9.</p>
Natural England	23 November 2018, Scoping Opinion	<p>Relevant Ecology and Nature Conservation Commitments Co26. NE would wish to see a commitment to restore hedgerows in a timely fashion and in equal or better habitat quality to those removed in order to contribute to coherent ecological networks and Net Gain in line with NPPF.</p>	<p>Commitments relevant to Ecology and Nature Conservation are presented in Table 3.12 and provided in full in Volume 4, Annex 5.2: Commitments Register.</p>
Natural England	23 November 2018, Scoping Opinion	<p>'Impact on great crested newt populations. The proposed cable route crosses areas known to support high numbers of great crested newt. NE welcomes the commitment to survey within the project footprint plus 250m. The</p>	<p>Details relating to the baseline survey study area for great crested newts are summarised in Section 3.7 and provided in full in Volume 6, Annex 6.3.4:</p>

Consultee	Date, Document, Forum	Comment	Where addressed in the PEIR
		surveys should identify any newt populations and areas of good or connecting newt habitat, within the potential corridor to allow for micro-siting and site connectivity at the landscape scale.	Great Crested Newt eDNA Survey Report.
Natural England	23 November 2018, Scoping Opinion	Natural England has adopted standing advice for protected species which includes links to guidance on survey and mitigation which we hope you will find helpful and can be found on the Gov.uk website.	Guidance documents used in conjunction with survey design and coordination and mitigation is presented in Section 3.3.7
Natural England	23 November 2018, Scoping Opinion	"Impacts on protected species: Operation phase Operation and maintenance activities of the onshore cable route could cause disturbance to protected species and merits further consideration."	All operational activities would be undertaken following the same guiding principles and commitments to working methodologies as those undertaken during construction activities, where relevant. . Further information on baseline environment is presented in Section 3.7 and the mitigation measures that Hornsea Four have committed to is presented in Table 3.12 . These will be progressed for DCO upon completion of outstanding baseline surveys.
Natural England	23 November 2018, Scoping Opinion	"Impacts on habitats: Decommissioning phase "Decommissioning of the onshore substation could lead to temporary habitat loss or degradation." NE is unclear if a 250 m buffer will be sufficient to provide space for a decommissioning area.	All decommissioning activities will be undertaken following the management and mitigation measures (as per Volume F2, Chapter 3: Outline Ecological Management Plan and Volume F2, Chapter 2: Outline Code of Construction Practice) and commitments to working methodologies as those to be undertaken during construction. The effects of decommissioning will be equal

Consultee	Date, Document, Forum	Comment	Where addressed in the PEIR
			<p>to or less than those at construction (Volume 1, Chapter 4: Project Description).</p> <p>An Onshore Decommissioning Plan will also be developed and will include provisions for the removal of all onshore above and below ground infrastructure in line with the latest relevant guidance (Co127).</p>
Natural England	23 November 2018, Scoping Opinion	NE welcome that suitable opportunities to enhance the nature conservation interest of the site will be developed. We would wish to see a commitment to net gain incorporated in the project design, in line with NPPF.	Applying the mitigation hierarchy, Hornsea Four will prioritise avoidance of biodiversity loss before attempting to provide gains which contribute toward onsite, local and strategic environmental priorities. The project endeavours to leave the environment in a better state than it was found, by working with ERYC, wildlife groups, landowners and local stakeholders to support their priorities for the local environment.
ERYC	Technical Panel Meeting – January 2019	Requested further information on what data sources would be used to inform the scope of planned phase 2 species specific surveys	Baseline environment is presented in Section 3.7 with a full list of the data sources used presented in Section 3.6 , however it should be noted that baseline surveys are still being undertaken and will be fully reported within the Hornsea Four ES.
ERYC	Technical Panel Meeting – April 2019	Raised that Hornsea Four should be mindful of crossing techniques used for Moor Lane Local Wildlife Site (LWS). The LWS requires a site integrity survey to be undertaken in order to inform any discussions on crossing techniques.	Hornsea Four will be consulting with all relevant stakeholders with regard to sensitive crossings that may be required. These conversations will be

Consultee	Date, Document, Forum	Comment	Where addressed in the PEIR
		<p>It was also raised that various LWS status had changed in status more recently, and that this information should be obtained from ERYC and incorporated in to the relevant assessments.</p> <p>Additionally, ERYC supported the use of a separate management plan to address embedded mitigation measures related to construction, as otherwise this information can be lost within the PEIR and ES.</p>	<p>undertaken throughout the PEIR/ES process, to be confirmed prior to construction of Hornsea Four.</p> <p>Hornsea Four obtained the updated citations from ERYC which are listed in detail in Volume 6, Annex 3.1: Extended Phase 1 Habitat Survey Report and summarised in Section 3.6. A habitats assessment based on this information has been provided in Section 3.10.</p> <p>An Outline Ecological Management Plan (Volume F2, Chapter 3) to support this Chapter.</p>
EA	Technical Panel Meeting – April 2019	Raised a query with regard to soils data being included within the ecology and nature conservation chapter	Details on soil and ground conditions are included in Volume 3, Chapter 1 Geology and Ground Conditions .
EA,, ERYC. RSPB, Natural England	Technical Panel Meeting – April 2019	Stakeholders requested that Hornsea Four present baseline data at PEIR where the data was available even if incomplete at the time of preparing the PEIR. However, it was agreed that no species assessments, and only habitats assessments would be provided as it would not be appropriate to attempt to draw conclusions from incomplete data. It was suggested that placeholders should be provided within the PEIR Chapter.	<p>The available baseline data has been prepared and presented in support of this Chapter in the form of Volume 6, Annex 3.1: Extended Phase 1 Habitat Survey Report; Volume 6, Annex 3.2: Onshore Ornithology – Wintering and Migratory Birds Survey Report; Volume 6, Annex 3.4: Great Crested Newt eDNA Survey Report; and Volume 6, Annex 3.10: Badger Survey Report (confidential).</p> <p>Placeholders in relation to the ecology and nature conservation species</p>

Consultee	Date, Document, Forum	Comment	Where addressed in the PEIR
			assessment have been provided in Section 3.10 .
Natural England	Technical Panel Meeting – July 2019	Natural England requested further information in relation to how Hornsea Four proposes to cross the River Hull Headwaters SSSI.	<p>Hornsea Four has committed to using HDD or other trenchless technologies (Co1) to cross the River Hull Headwater SSSI. Additionally, no access will be taken across it as evidenced in Volume 4, Annex 4.2: Onshore Crossing Schedule.</p> <p>Hornsea has also committed to carrying out a pre-construction hydrogeological risk assessment on particularly sensitive sites to inform a detailed crossing method statement which will be agreed with the relevant authorities (Co18).</p>

3.5 Study area

3.5.1.1 The study areas for onshore ecological receptors are provided in [Table 3.5](#). Different study areas have been used for different receptors depending on their sensitivity and their habitat preferences. These study areas were selected according to standard industry guidance (CIEEM, 2018) which is presented in [Section 3.3](#), as well as using professional judgement and experience. These study areas were agreed with stakeholders during the Evidence Plan process.

3.5.1.2 The study areas include the Hornsea Four PEIR boundary, including the associated onshore infrastructure for the following components, alongside an additional ‘buffer’ as highlighted in [Table 3.5](#).

- The landfall (including logistics compounds and connection works areas);
- Onshore Export Cable Corridor (ECC) (including permanent and temporary works areas); and
- Onshore Substation (OnSS) site (including permanent and temporary storage areas, Energy Balancing Infrastructure (EBI) and 400 kV ECC).

3.5.1.3 An overview of each study area used for ecological receptors is shown on [Figure 3.1](#) to [Figure 3.5](#).

Table 3.5: Study areas used for ecological receptors considered in this PEIR.

Data / Survey	Study area
Protected and notable species (excluding great crested newts and bats) – herein referred to as the ‘Data search study area’	Within and up to 2 km from the Hornsea Four PEIR boundary as shown on Figure 3.1 - Figure 3.5 .
Great crested newts – herein referred to as the ‘GCN study area’	Within and up to 250 m from the Hornsea Four PEIR boundary as shown on Figure 3.1 - Figure 3.5 .
Bats – herein referred to as the ‘Bat study area’	Within and up to 5 km from the Hornsea Four PEIR boundary as shown on Figure 3.1 - Figure 3.5 .
Statutory and non-statutory designated sites – herein referred to as the ‘Data search study area’	Within and up to 2 km from the Hornsea Four PEIR boundary as shown on Figure 3.1 - Figure 3.5 .
UK Habitats of Principal Importance (UKHPI) and Forestry habitats – Data search study area	Within and up to 2 km from the Hornsea Four PEIR boundary as shown on Figure 3.1 - Figure 3.5 .
Statutory Sites and Associate Impact Risk Zones (IRZ) – Data search study area	Within and up to 2 km from the Hornsea Four PEIR boundary as shown on Figure 3.1 - Figure 3.5 .
Updated Extended Phase 1 Habitat Survey – herein referred to as the ‘EP1HS study area’	Within and up to 50 m from the Hornsea Four PEIR boundary as shown on Figure 3.1 - Figure 3.5 .

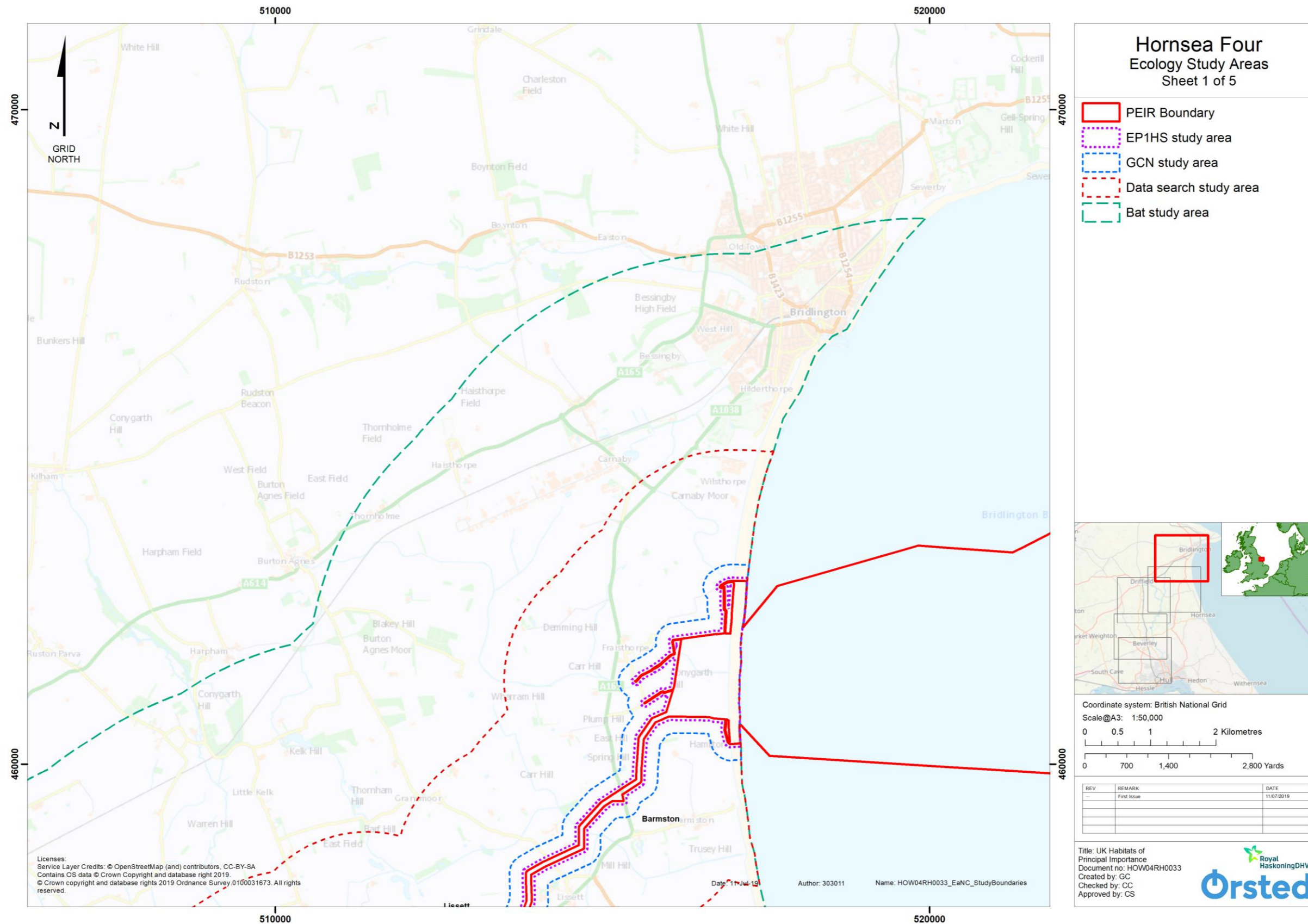


Figure 3.1 Study areas relevant to Ecology and Nature Conservation (Not to Scale).

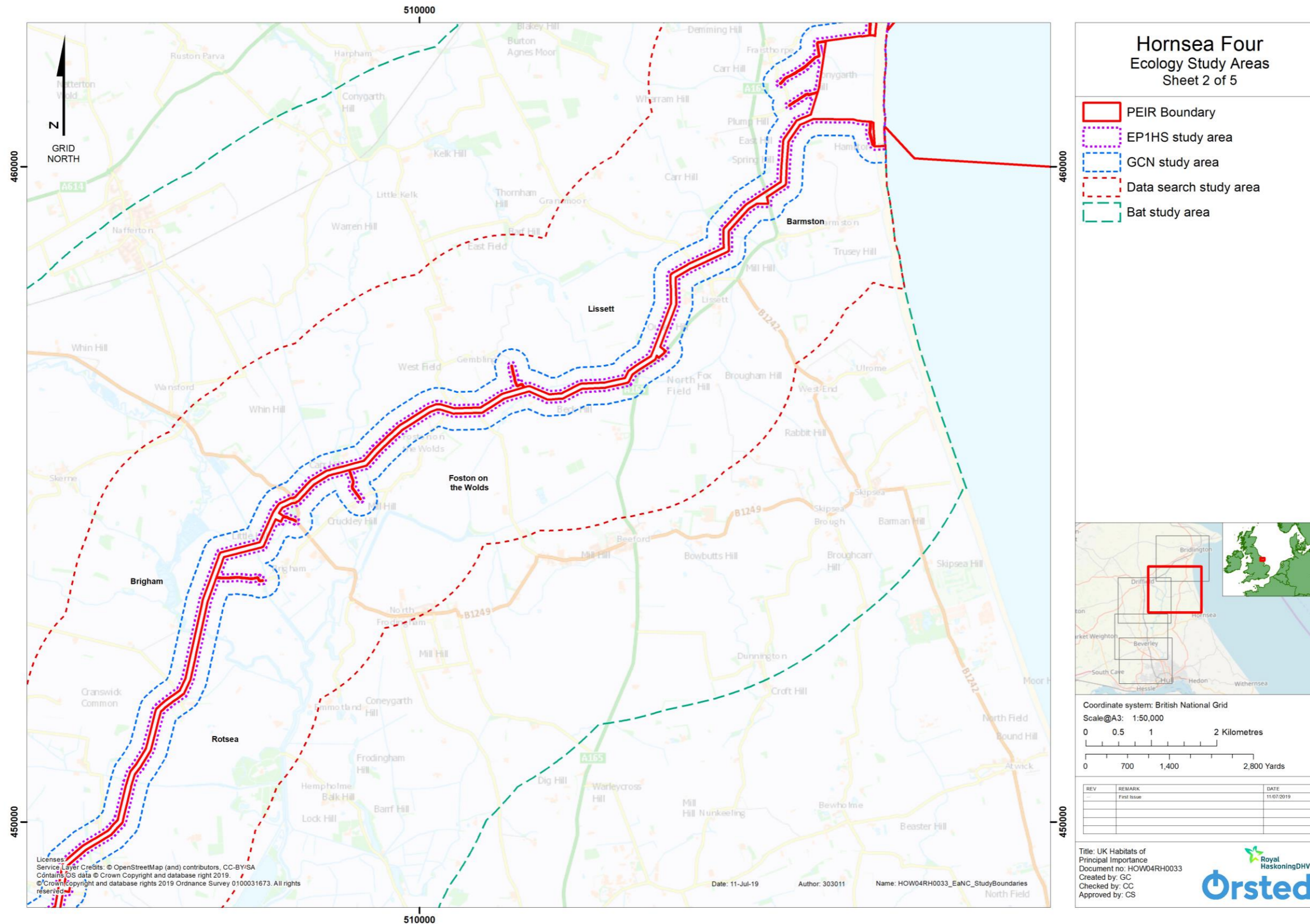


Figure 3.2 Study areas relevant to Ecology and Nature Conservation (Not to Scale)

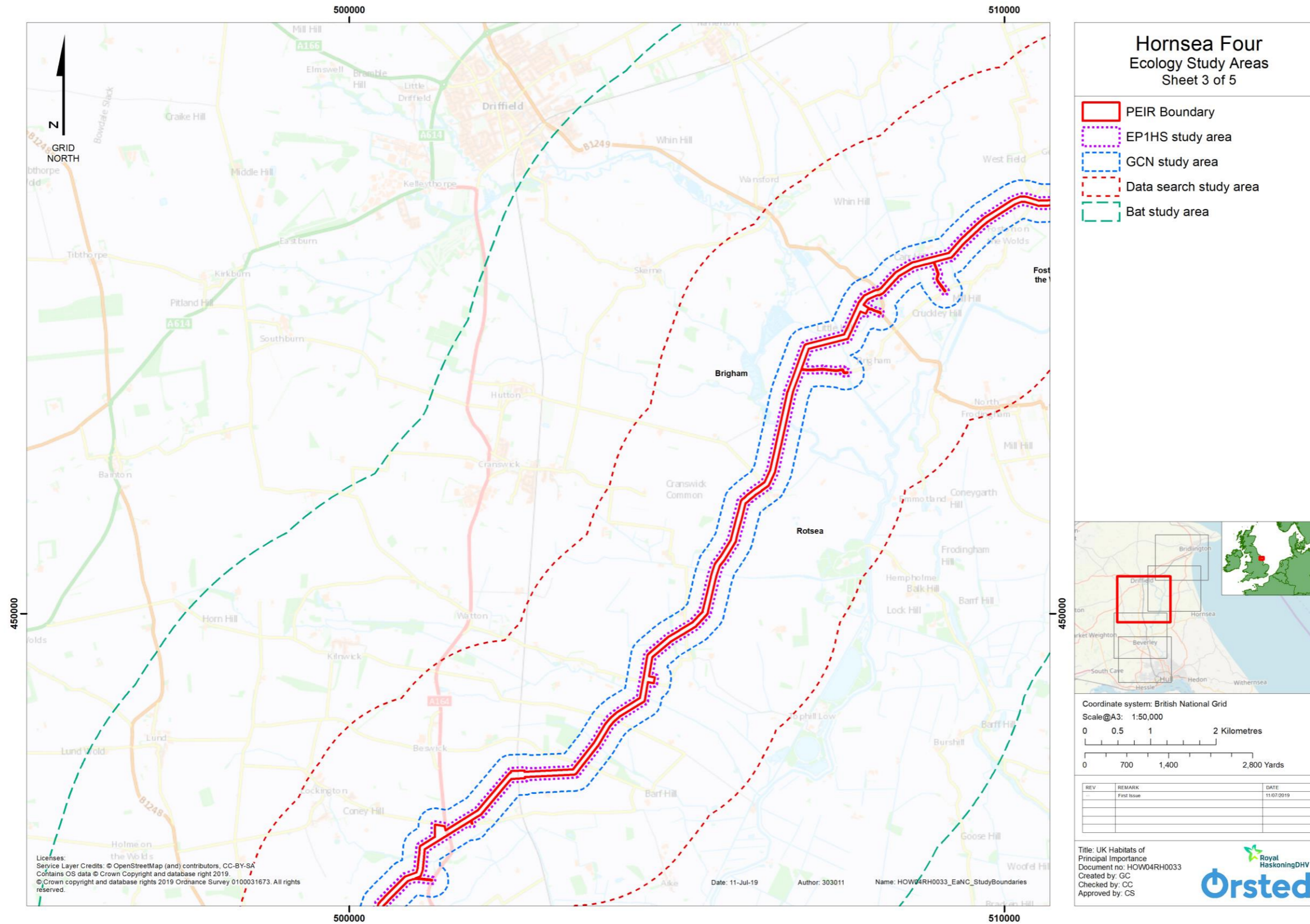


Figure 3.3 Study areas relevant to Ecology and Nature Conservation (Not to Scale)

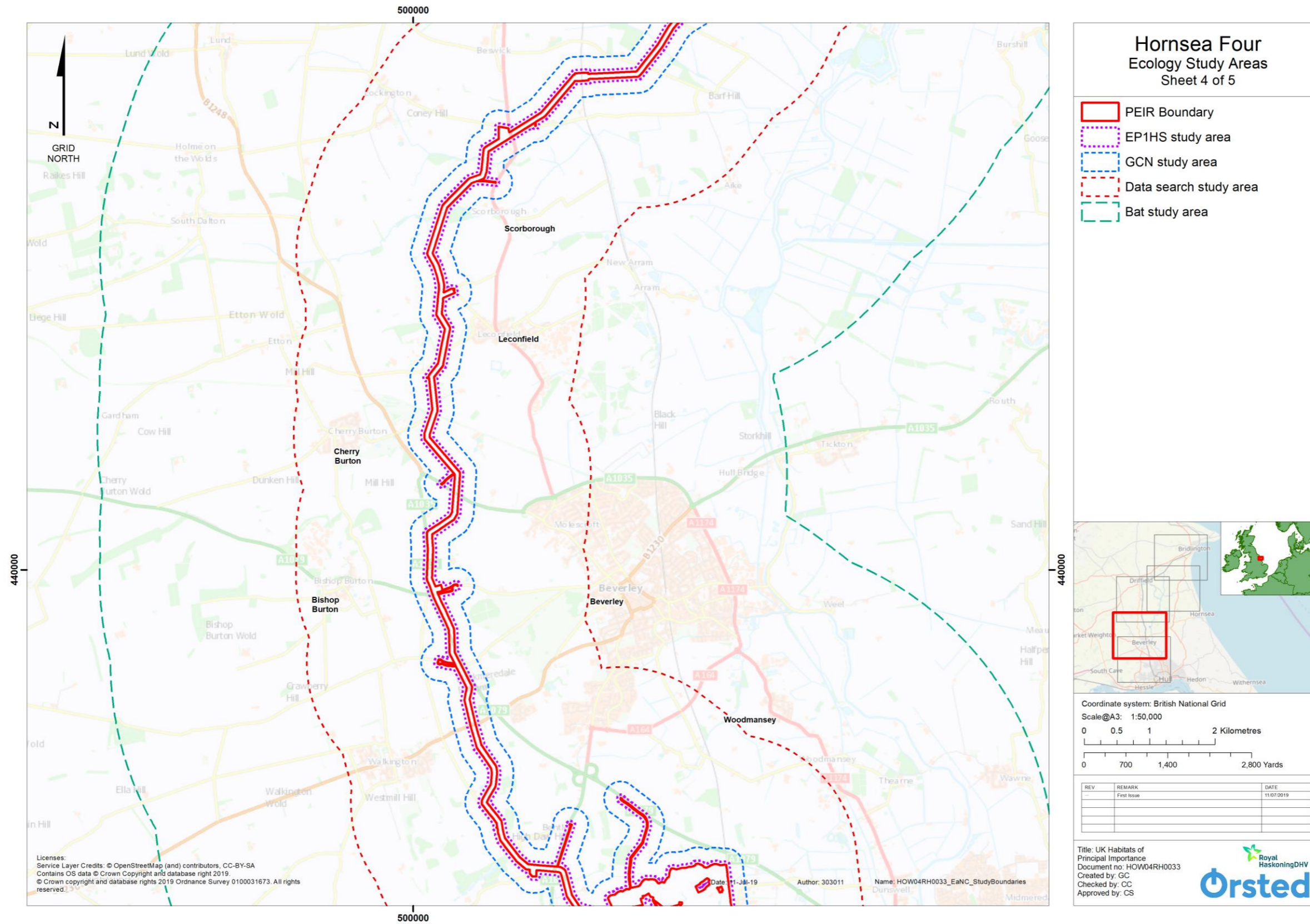


Figure 3.4 Study areas relevant to Ecology and Nature Conservation (Not to Scale)

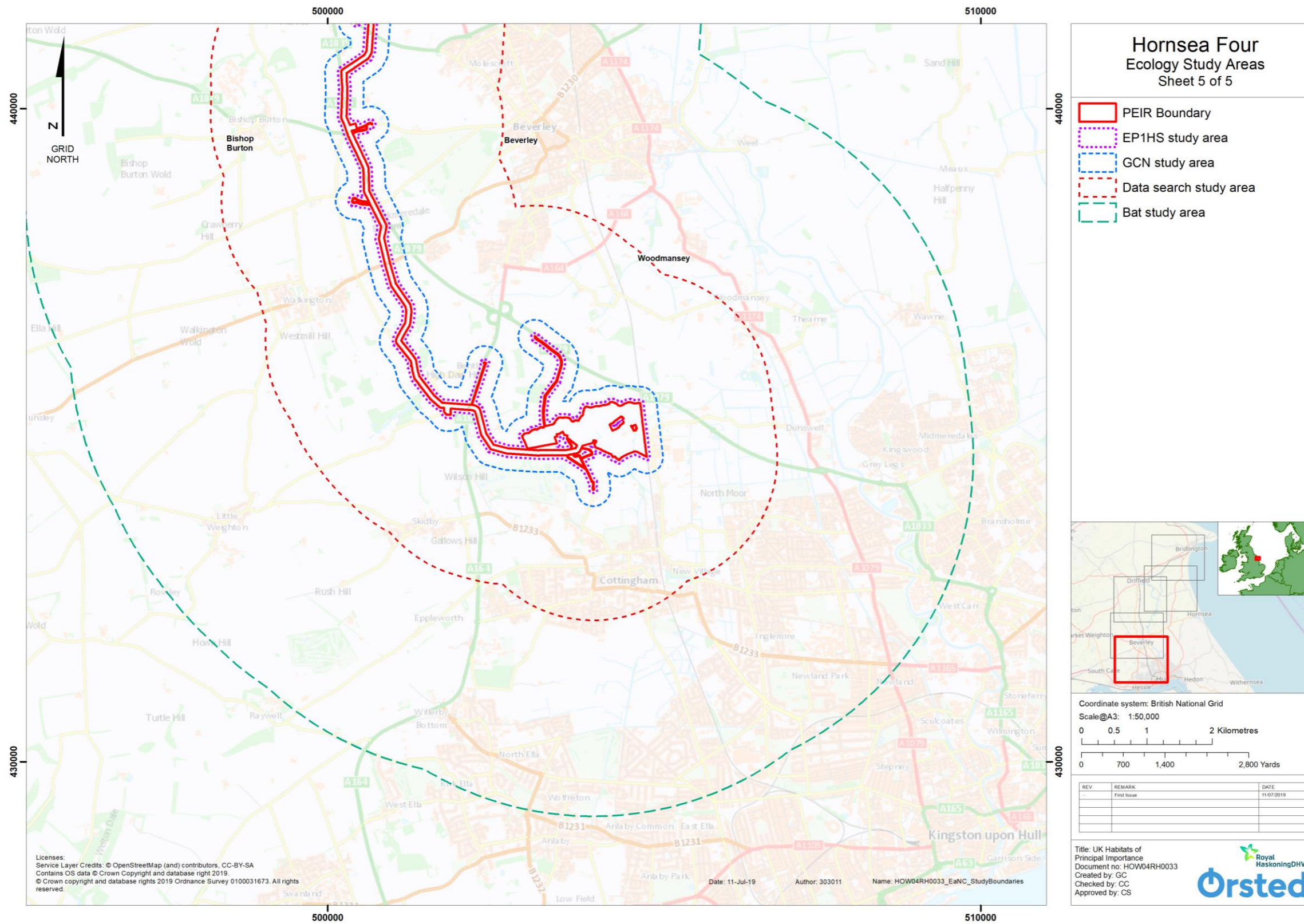


Figure 3.5 Study areas relevant to Ecology and Nature Conservation (Not to Scale)

3.6 Methodology to inform baseline

3.6.1. Desktop Study

3.6.1.1 A desk study was undertaken to obtain information on ecology and nature conservation. Data has been acquired for the respective study areas defined in [Section 3.5](#). A thorough and detailed desktop review of existing studies and datasets has been undertaken to inform this chapter.

3.6.1.2 The data sources that have been collected and used to inform this Ecological Impact Assessment (EclA) are summarised in [Table 3.6](#).

Table 3.6: Summary of data sources used to inform this EclA.

Data source	Date reviewed	Data contents	Coverage
Desk study data			
Joint Nature Conservation Committee (JNCC)	January 2019	European designated sites (SPA, SAC, Ramsar sites)	Data search study area
JNCC / MAGIC Natural England	January 2019	UK designated sites (SSSI, National Nature Reserve (NNR), LNR)	Data search study area
JNCC / MAGIC Forestry Commission	January 2019	UK Habitats of Principal Importance Ancient Woodland, Woodland categories	EP1HS study area
North and East Yorkshire Ecological Data Centre (NEYEDC)	January 2019	Locally designated sites (LWS) Protected and notable species records including: <ul style="list-style-type: none"> - Wildlife and Countryside Act 1981 Schedules 1, 5, 8 & 9; - The Conservation of Habitats & Species Regulations 2010 Schedules 2 & 5; - Protection of Badgers Act 1992; - Bonn Convention Appendix 1 & 2; - Bern Convention Annex 2, 4, & 5; - Habitats Directive Annex 2, 4 & 5; - NERC Act 2006 Section 41 species; - UK BAP (Biodiversity Action Plan) species (both local and national); - IUCN (International Union for Conservation of Nature), Red List Species; - Nationally Notable species; - Locally rare species 	Data search study area and Bat study area
Ordnance Survey (OS)	March 2019	Large-scale mapping to determine the presence of ponds that may be suitable for great crested newts	GCN study area
APEM Ltd	July 2018	High-resolution (3 cm) aerial photography data	EP1HS study area

3.6.2. Site Specific Surveys

- 3.6.2.1 An updated Extended Phase 1 Habitat Survey (EP1HS) was undertaken in February 2019 to expand on the details of habitat types gathered during an EP1HS undertaken in June 2018 and to determine the scope of phase 2 species specific surveys that would be required.
- 3.6.2.2 As detailed in [Section 3.7.7](#), survey coverage of the updated EP1HS was limited to approximately 50% of the Hornsea Four onshore area. The findings from the updated EP1HS have been used to present the baseline conditions within [Section 3.7](#) and are provided in full within [Volume 6, Annex 3.1: Extended Phase 1 Habitat Survey Report](#).
- 3.6.2.3 Since the completion of the updated EP1HS in February 2019, further landowner access agreements have been put in to place by Hornsea Four, which will allow for additional survey work to be undertaken to inform the Hornsea Four ES in August and September 2019.
- 3.6.2.4 [Table 3.7](#) summarises the ecological field surveys that are ongoing at the time of preparing this document.

Table 3.7: Summary and status of ecological field surveys.

Title, year and reference	Scope	Coverage of Hornsea Four development area	Survey status
<p>Hornsea Four Over-wintering Bird Survey, November 2018 – March 2019, inclusive</p> <p>Volume 6, Annex 3.2: Onshore Ornithology – Wintering and Migratory Birds Survey Report</p>	<p>A suite of monthly surveys to collect baseline data on bird assemblages associated within the area of the onshore infrastructure</p>	<p>Landfall, onshore ECC and OnSS, where land access was granted.</p>	<p>Complete</p>
<p>Hornsea Four Updated Extended Phase 1 Habitat Survey, February 2019</p> <p>Volume 6, Annex 3.1: Extended Phase 1 Habitat Survey Report</p>	<p>An Extended Phase 1 Habitat Survey following ‘Extended Phase 1’ methodology as set out in Guidelines for Baseline Ecological Assessment (Institute of Environmental Assessment (IEMA), 1995). Habitats were classified and mapped following JNCC’s Handbook for Phase 1 habitat survey: A technique for environmental audit (2010).</p> <p>Included a search for:</p> <ul style="list-style-type: none"> - Field signs of badgers; - Assessment of roost suitability of trees and structures for bats; - Assessment of commuting / foraging suitability of all linear features for bats; - Field signs of otter; - Assessment of suitability of watercourse to support water voles; - Habitats suitability assessment of all standing water bodies for ability to support great crested newts; - Assessment of suitability of habitats to support reptiles; 	<p>Landfall, onshore ECC and OnSS, plus 250 m buffer, where land access was granted</p> <p>All other habitats and species: onshore infrastructure plus a 50 m buffer</p>	<p>50% of Hornsea Four onshore area complete</p> <p>50% of Hornsea Four onshore area to be subject to a further survey effort to inform the Hornsea Four ES.</p>

Hornsea 4

Title, year and reference	Scope	Coverage of Hornsea Four development area	Survey status
	<ul style="list-style-type: none"> - Assessment of suitability of habitats to notable invertebrates; and - Evidence of non-native invasive species. 		
<p>Hornsea Four Great crested newt eDNA survey, April 2019</p> <p>Volume 6, Annex 3.4: Great Crested Newt eDNA Survey Report</p>	<p>A great crested newt environmental DNA (eDNA) survey of ponds within, and up to 250 m of the Hornsea Four onshore area.</p>	<p>Hornsea Four onshore area plus a 250 m buffer</p>	<p>A total of 85 ponds identified, of which 12 remain to be surveyed. To be completed (dependent on landowner access) in 2019 and reported in the Hornsea Four ES.</p>
<p>Hornsea Four Badger presence/absence survey, February 2019</p> <p>Volume 6, Annex 3.10: Badger Survey Report</p>	<p>A badger presence/absence survey of all suitable habitats (including field margins, dry drain systems, woodland edges).</p>	<p>Hornsea Four onshore area plus a 50 m buffer</p>	<p>50% of Hornsea Four onshore area surveyed for badger presence (in conjunction with updated Extended Phase 1 Habitat Survey).</p> <p>The remaining 50% of the Hornsea Four onshore area to be surveyed in 2019 and reported in the Hornsea Four ES.</p>
<p>Hornsea Four Water vole survey</p>	<p>A water vole presence/absence survey and population estimate of watercourses identified as suitable to support water voles during the updated Extended Phase 1 Habitat Survey. Field signs of otter to also be recorded during this survey</p>	<p>Hornsea Four onshore area plus a 50 m buffer</p>	<p>Are in the process of being completed between July and September 2019, and will be reported on in Volume 6, Annex 3.5: Watervole</p>

Title, year and reference	Scope	Coverage of Hornsea Four development area	Survey status
			<p>Survey Report to support the ES only.</p>
<p>Hornsea Four Bat emergence/re-entry surveys</p>	<p>Bat emergence/re-entry surveys of all trees and structures identified during the updated Extended Phase 1 Habitat Survey as providing moderate or high suitability for roosting bats.</p>	<p>Hornsea Four onshore area plus a 50 m buffer</p>	<p>Are in the process of being completed between May and August 2019 (inclusive), and will be reported on in Volume 6, Annex 3.8: Bat Survey Report to support the ES only.</p>
<p>Hornsea Four Bat activity surveys (monthly survey visits to be undertaken between May and October 2019 inclusive)</p> <p>Full details to be reported on within the Hornsea Four ES.</p>	<p>Bat activity surveys of all linear features (hedgerows, watercourses, scrub and woodland edges) identified during the updated Extended Phase 1 Habitat Survey as providing moderate or high suitability for commuting/foraging bats.</p>	<p>Hornsea Four onshore area plus a 50 m buffer</p>	<p>Are in the process of being completed between May and October 2019 (inclusive), and will be reported on in Volume 6, Annex 3.8: Bat Survey Report to support the ES only.</p>
<p>Hornsea Four Breeding Bird Survey</p>	<p>The breeding bird survey will follow the methodology of the over-wintering and migratory bird survey, utilising a combination of VP counts and walkover surveys to determine the presence and utilisation of breeding birds within a 50 m buffer of the onshore infrastructure.</p>	<p>Hornsea Four onshore area plus a 50 m buffer</p>	<p>Completed fortnightly between April and June 2019 (inclusive). The results were not available at the point of writing this report and therefore will be reported on in Volume 6, Annex 3.3: Breeding Bird Survey Report to support the ES only.</p>

3.7 Baseline environment

3.7.1. Existing baseline -Designated sites

3.7.1.1 There are four statutory designated sites within the Data search study area (as explained in [Table 3.5](#)). One of these, the River Hull Headwaters SSSI, is situated within the data search study area.

3.7.1.2 There are six non-statutory designated sites within the Hornsea Four onshore PEIR boundary and an additional 41 within the data search study area.

3.7.1.3 The designated and non-designated sites are shown on [Figure 3.6](#) to [Figure 3.10](#) and described in [Table 3.8](#).

Table 3.8: Statutory and non-statutory sites within the data search study area.

Designated site	Approximate proximity to Hornsea Four PEIR boundary (at closest point)	Reason for designated status
Statutory designated sites		
River Hull Headwaters SSSI	Inside Hornsea Four onshore PEIR boundary	Chalk stream, characteristic riverside grassland, woodland and fen habitats. The river valley supports a diverse breeding bird community including lapwing, snipe, redshank alongside mallard and mute swan, yellow wagtail, sedge warbler, reed warbler, reed bunting and many more widely occurring species.
Bryan Mills Field SSSI	150 m	Tall fen, spring fed marsh and fen plant species
Burton Bushes SSSI	300 m	Ancient woodland
Greater Wash SPA	1 km	Marine habitats (intertidal mudflats and sandflats, subtidal sandbanks and biogenic reef). Red throated diver, common scoter, little gull, breeding sandwich tern, common tern and little tern
Non-statutory designated sites (Local Wildlife Sites (LWS))		
Moor Lane	Inside Hornsea Four onshore PEIR boundary	Hedge
Newbald Road	Inside Hornsea Four onshore PEIR boundary	Hedge
Raventhorpe Embankment	Inside Hornsea Four onshore PEIR boundary	Grassland, scrub

Designated site	Approximate proximity to Hornsea Four PEIR boundary (at closest point)	Reason for designated status
Bryan Mills Beck	Inside Hornsea Four onshore PEIR boundary	Stream
Bealey's Beck, Lockington	Inside Hornsea Four onshore PEIR boundary	Stream
Jillywood Lane	Inside Hornsea Four onshore PEIR boundary	Hedge and medieval track/boundary
Old Lane, Leconfield	< 100 m	TBC as in the process of obtaining the data from NEYEDC
Lake's Wood	< 100 m	TBC as in the process of obtaining the data from NEYEDC
Bygot Wood Lane, Leconfield	< 100 m	TBC as in the process of obtaining the data from NEYEDC
Woodhill Path, Cottingham	< 100 m	Hedge
Fishpond Wood, Risby Estate	< 100 m	TBC as in the process of obtaining the data from NEYEDC
Birkhill Wood	150 m	Ancient woodland
Drove Road	150 m	TBC as in the process of obtaining the data from NEYEDC
Gembling Common	200 m	TBC as in the process of obtaining the data from NEYEDC
Burton Bushes Veteran Trees	300 m	TBC as in the process of obtaining the data from NEYEDC
Cranswick Common	300 m	TBC as in the process of obtaining the data from NEYEDC
Bealey's Lane	350 m	TBC as in the process of obtaining the data from NEYEDC
Shorthill Hag	450 m	TBC as in the process of obtaining the data from NEYEDC
Bentley Moor Wood	450 m	TBC as in the process of obtaining the data from NEYEDC
Risby Park	500 m	TBC as in the process of obtaining the data from NEYEDC
Mill Beck and Fields	600 m	TBC as in the process of obtaining the data from NEYEDC
Lockington	600 m	TBC as in the process of obtaining the data from NEYEDC
Newbald Road, Beverley	700 m	TBC as in the process of obtaining the data from NEYEDC
Corpslanding Road	800 m	TBC as in the process of obtaining the data from NEYEDC
Foston Fox Covert Heronry	800 m	TBC as in the process of obtaining the data from NEYEDC
Barff Hill Causeway	800 m	TBC as in the process of obtaining the data from NEYEDC
Scorborough Lane	800 m	TBC as in the process of obtaining the data from NEYEDC
Beverley Westwood Waxcaps	1 km	TBC as in the process of obtaining the data from NEYEDC
Gravel Pit, North Frodingham	1 km	TBC as in the process of obtaining the data from NEYEDC
Beverley Limekilns	1 km	TBC as in the process of obtaining the data from NEYEDC
Driffield Road	1 km	TBC as in the process of obtaining the data from NEYEDC
Wilsthorpe Dunes	1 km	TBC as in the process of obtaining the data from NEYEDC
Copper Hall Wood	1.5 km	TBC as in the process of obtaining the data from NEYEDC
Leman Road Corner - Moorbeck Road (b)	1.5 km	TBC as in the process of obtaining the data from NEYEDC
Leman Wood	1.5 km	TBC as in the process of obtaining the data from NEYEDC

Designated site	Approximate proximity to Hornsea Four PEIR boundary (at closest point)	Reason for designated status
Emmotland Soak Drain	1.5 km	TBC as in the process of obtaining the data from NEYEDC
Leman Road Corner - Moorbeck Road (a)	1.5 km	TBC as in the process of obtaining the data from NEYEDC
Mill Dam Beswick	1.5 km	TBC as in the process of obtaining the data from NEYEDC
Sheepman Lane	1.7 km	TBC as in the process of obtaining the data from NEYEDC
Low Balk Road, Bishop Burton	1.9 km	TBC as in the process of obtaining the data from NEYEDC
Watton Carr	19 km	TBC as in the process of obtaining the data from NEYEDC

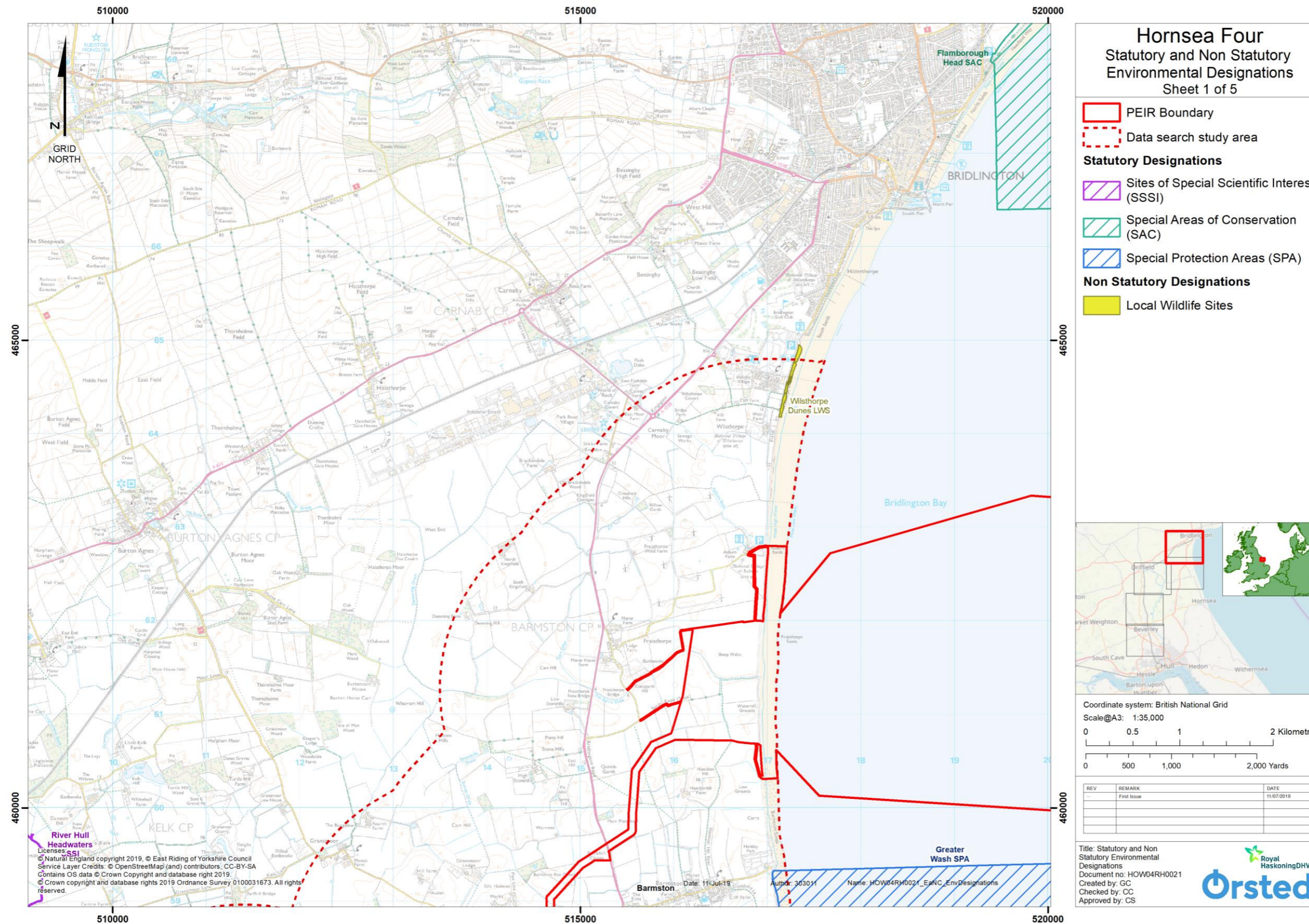


Figure 3.6: Statutory and non-statutory designated sites within the data search study area Sheet 1 (Not to Scale).

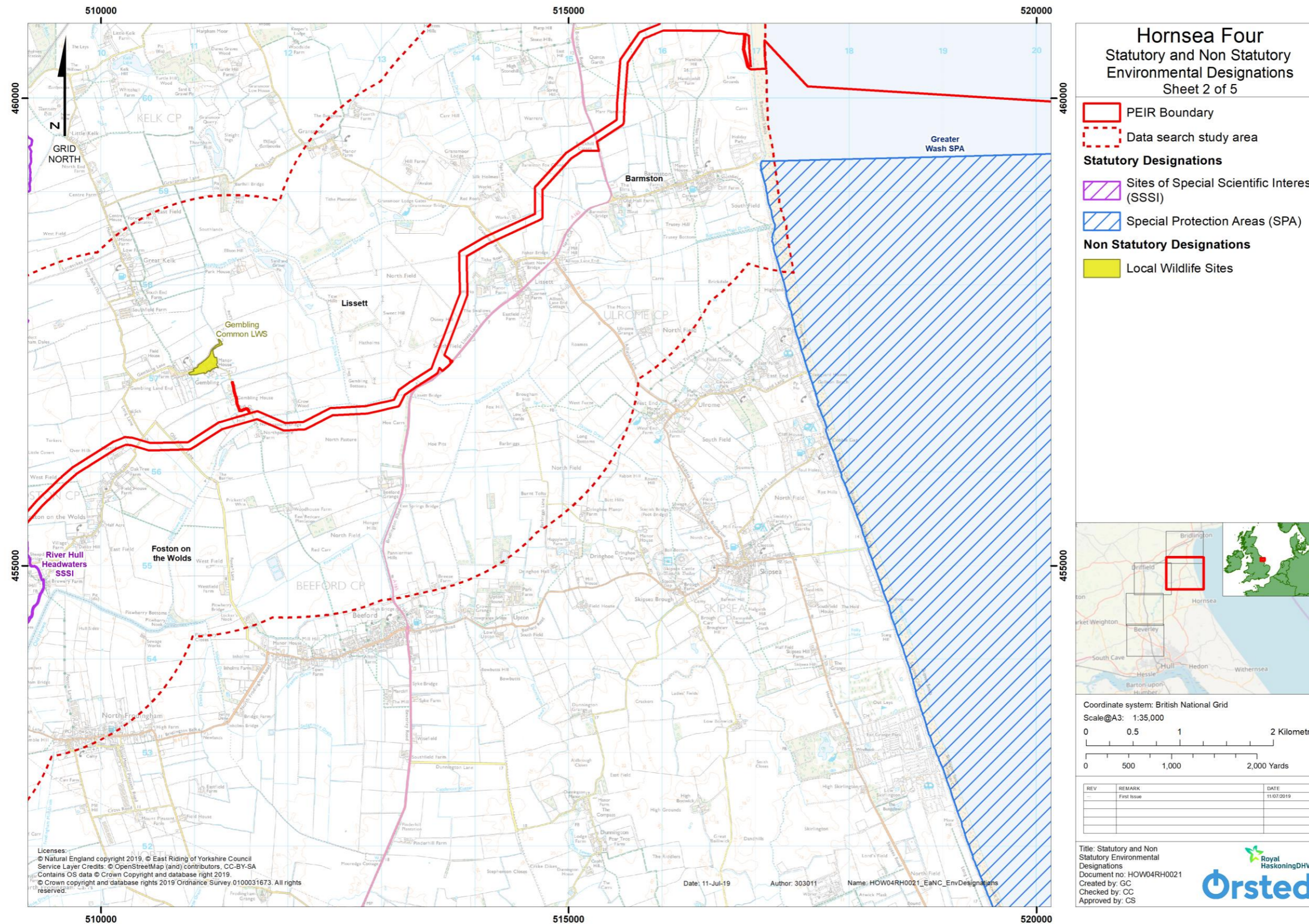


Figure 3.7: Statutory and non-statutory designated sites within the data search study area Sheet 2 (Not to Scale).

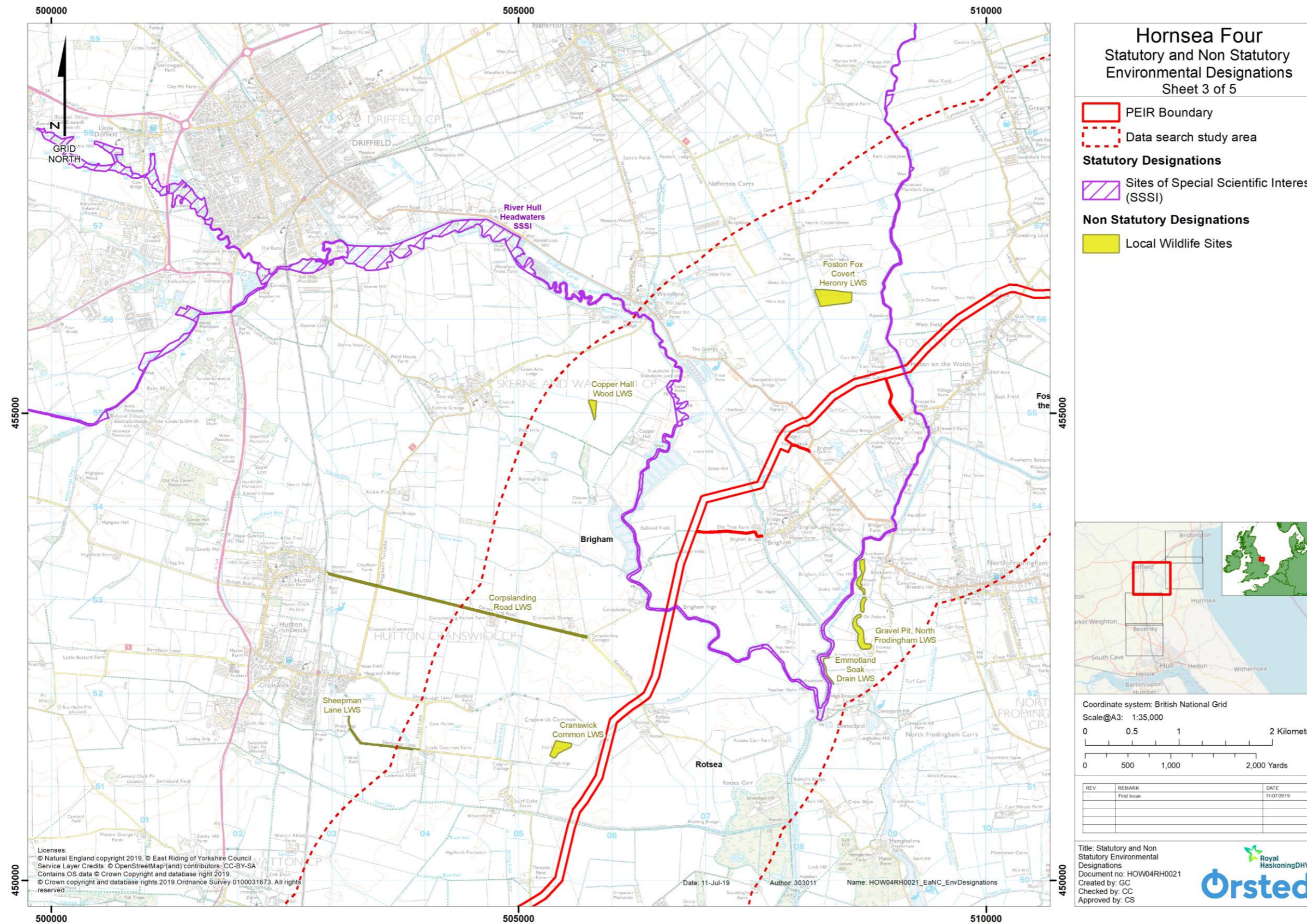


Figure 3.8: Statutory and non-statutory designated sites within the data search study area Sheet 3 (Not to Scale).

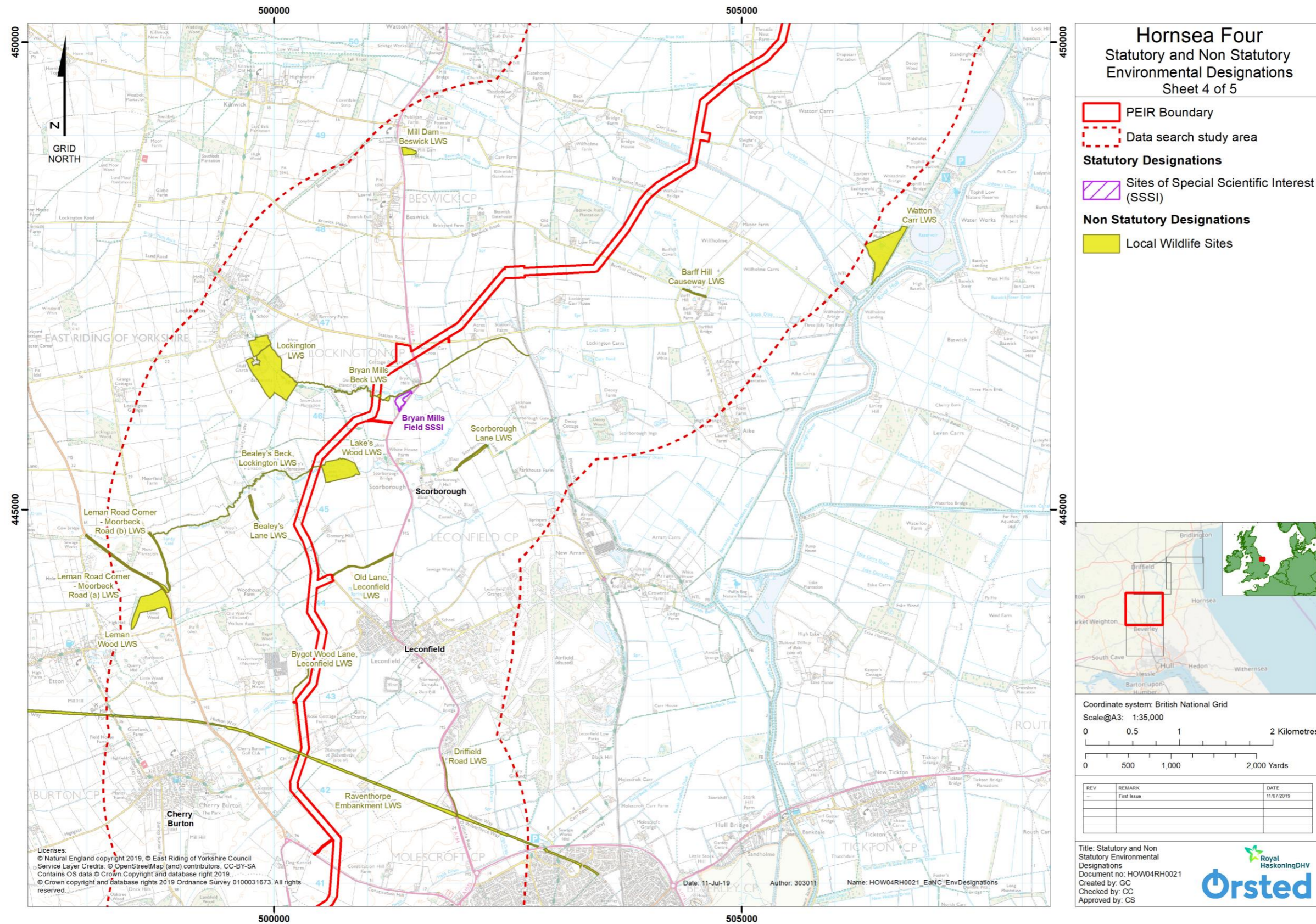


Figure 3.9: Statutory and non-statutory designated sites within the data search study area Sheet 4 (Not to Scale).

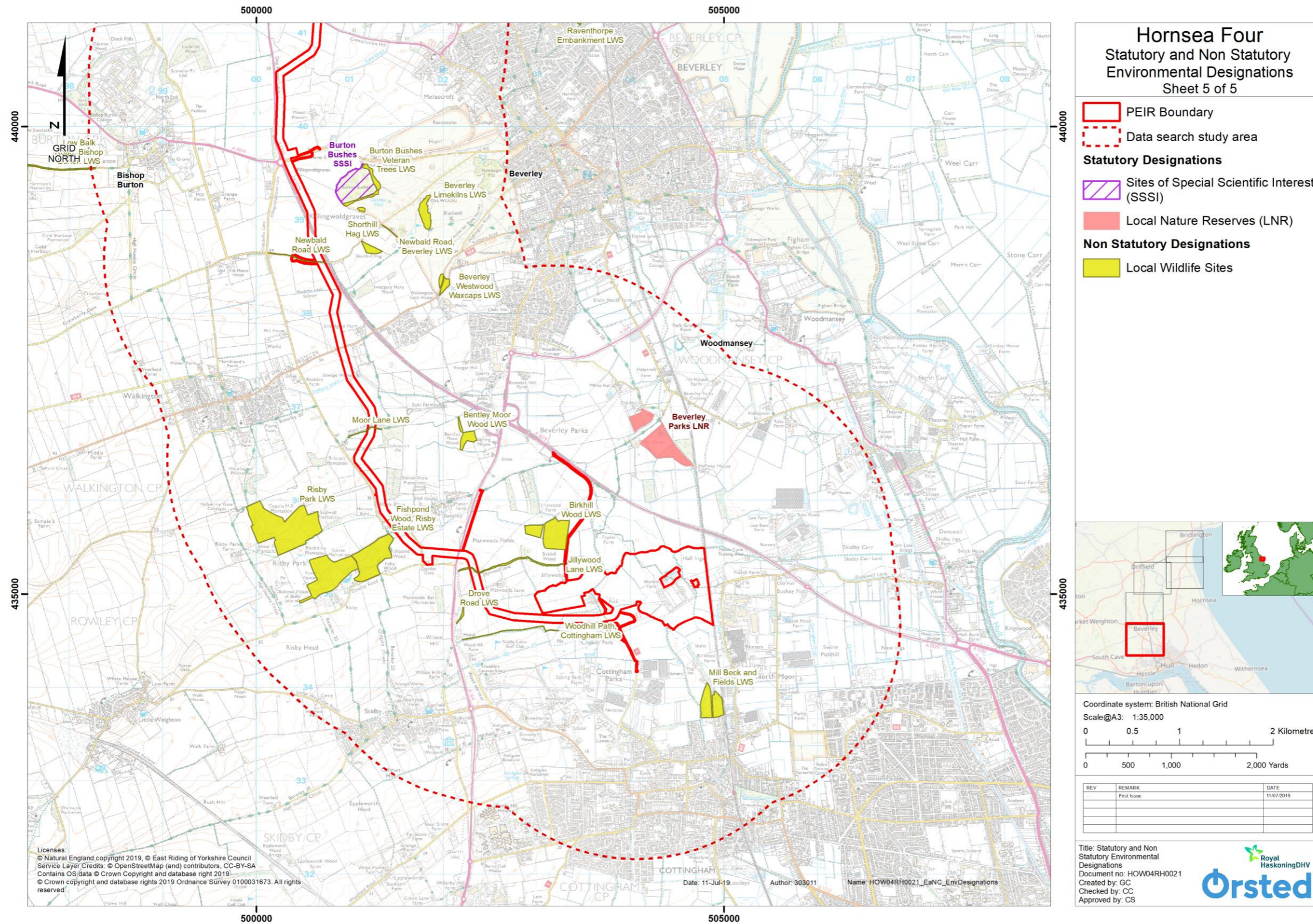


Figure 3.10: Statutory and non-statutory designated sites within the data search study area Sheet 5 (Not to Scale).

3.7.2. UK Habitats of Principal Importance

3.7.2.1 The following UK Habitats of Principle Importance (UKHPI) are present within the Hornsea Four onshore PEIR boundary:

- Coastal and Floodplain Grazing Marsh;
- Deciduous Woodland;
- Maritime Cliff and Slope;
- Reedbeds; and
- Traditional Orchards.

3.7.2.2 All UKHPI are shown on [Figure 3.11](#) to [Figure 3.15](#) These figures also include the habitat data collated from the National Forestry Commission dataset. Key woodland habitat types that are present within the Hornsea Four onshore PEIR boundary are as follows:

- Assumed Woodland;
- Broadleaved;
- Conifer;
- Mixed Woodland – predominantly Broadleaved;
- Mixed Woodland – predominantly Conifer; and
- Young trees.

3.7.2.3 In accordance with a request from stakeholders to consider Natural England's SSSI IRZ, [Figure 3.16](#) shows those IRZs relevant to the designated sites that have been identified, namely the River Hull Headwaters SSSI and the Bryan Mills Field SSSI.

3.7.2.4 The IRZs are a tool developed by Natural England in order to assist in identifying potential risks on designated sites. The IRZs define zones around each SSSI which reflect the sensitivities of the features for which it is notified and indicates the types of development proposal which could potentially have adverse impacts (Natural England, 2019).

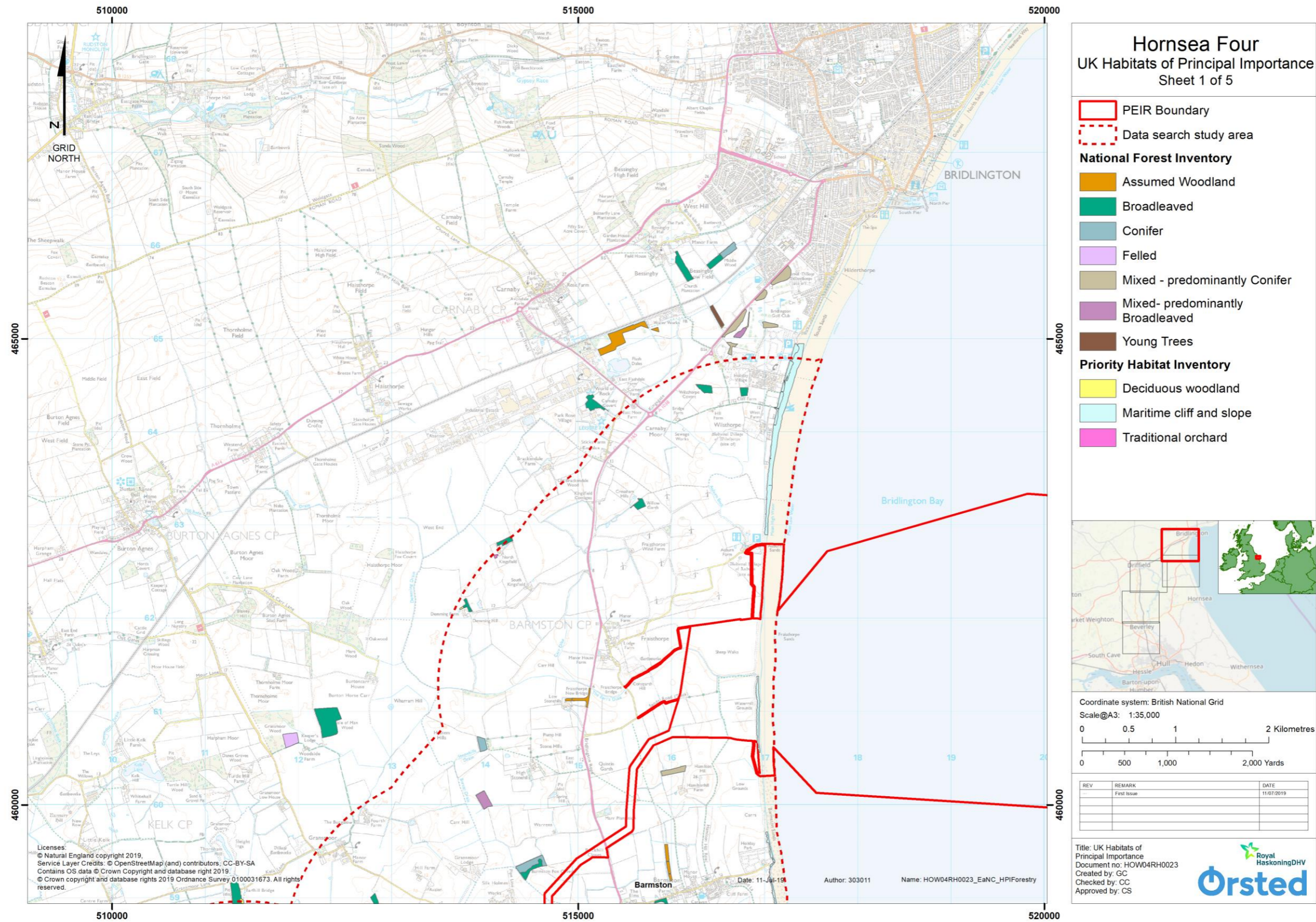


Figure 3.11: UK Habitats of Principal Importance and National Forestry Commission Data Sheet 1 (Not to Scale).

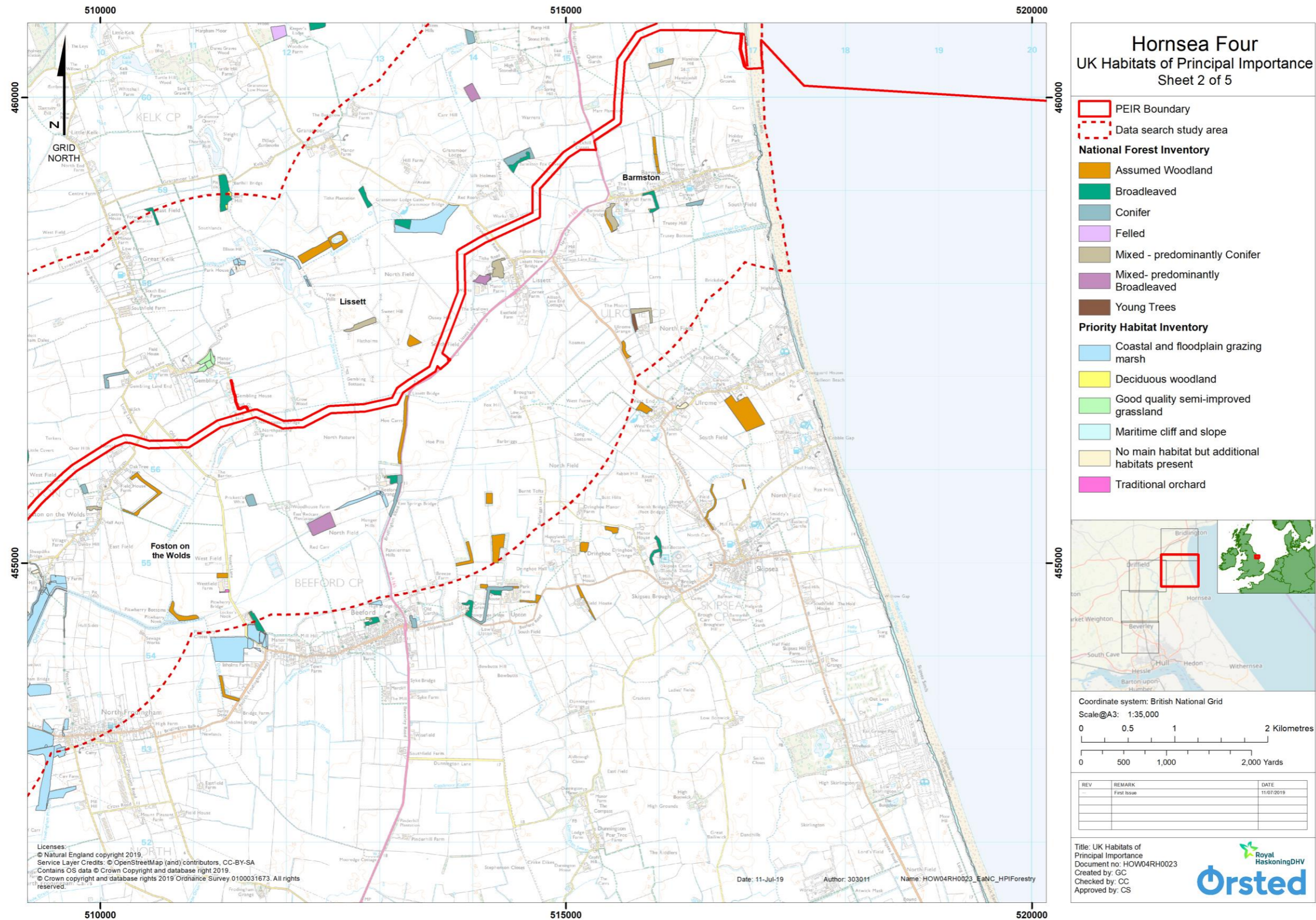


Figure 3.12: UK Habitats of Principal Importance and National Forestry Commission Data Sheet 2 (Not to Scale).

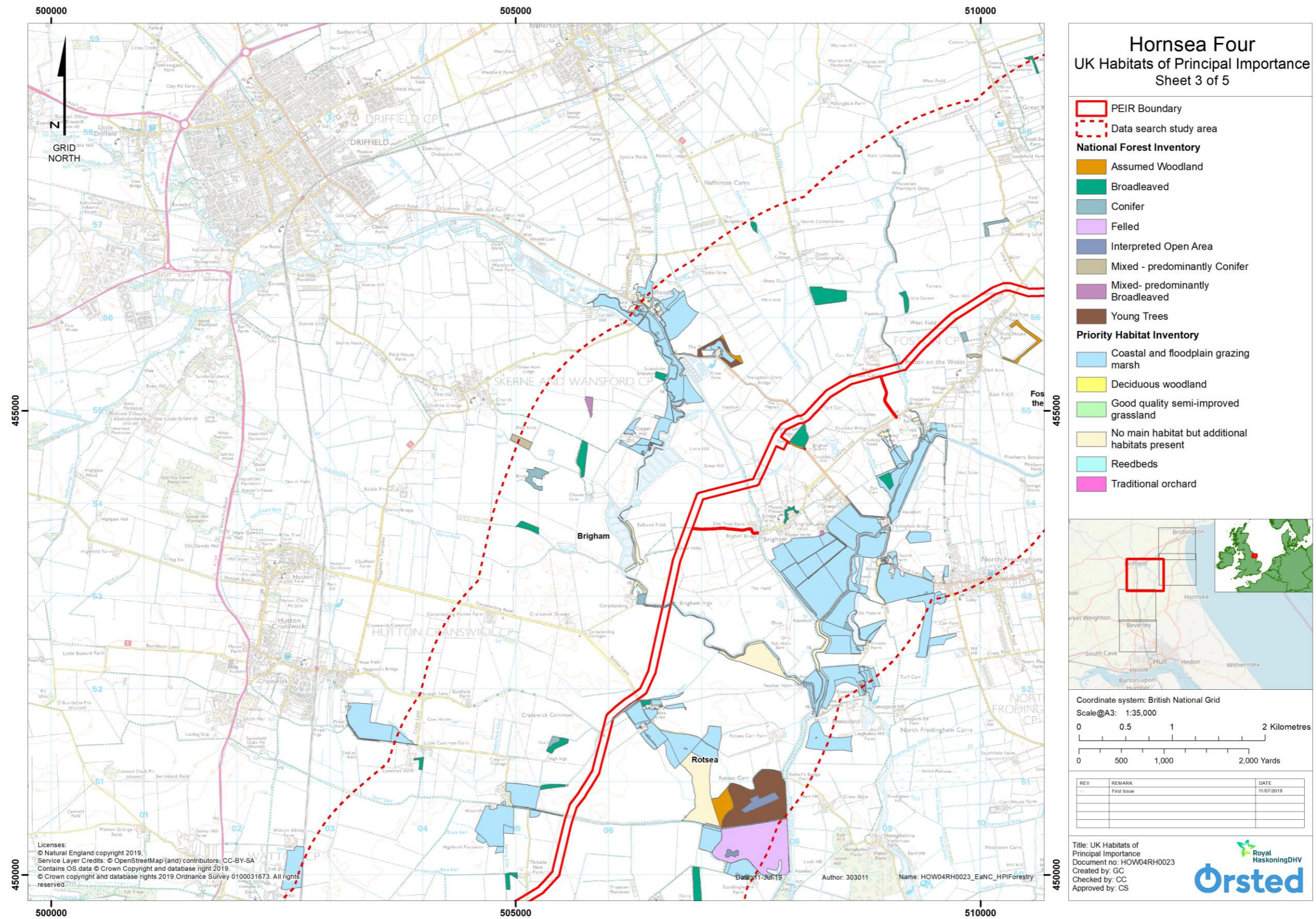


Figure 3.13: UK Habitats of Principal Importance and National Forestry Commission Data Sheet 3 (Not to Scale).

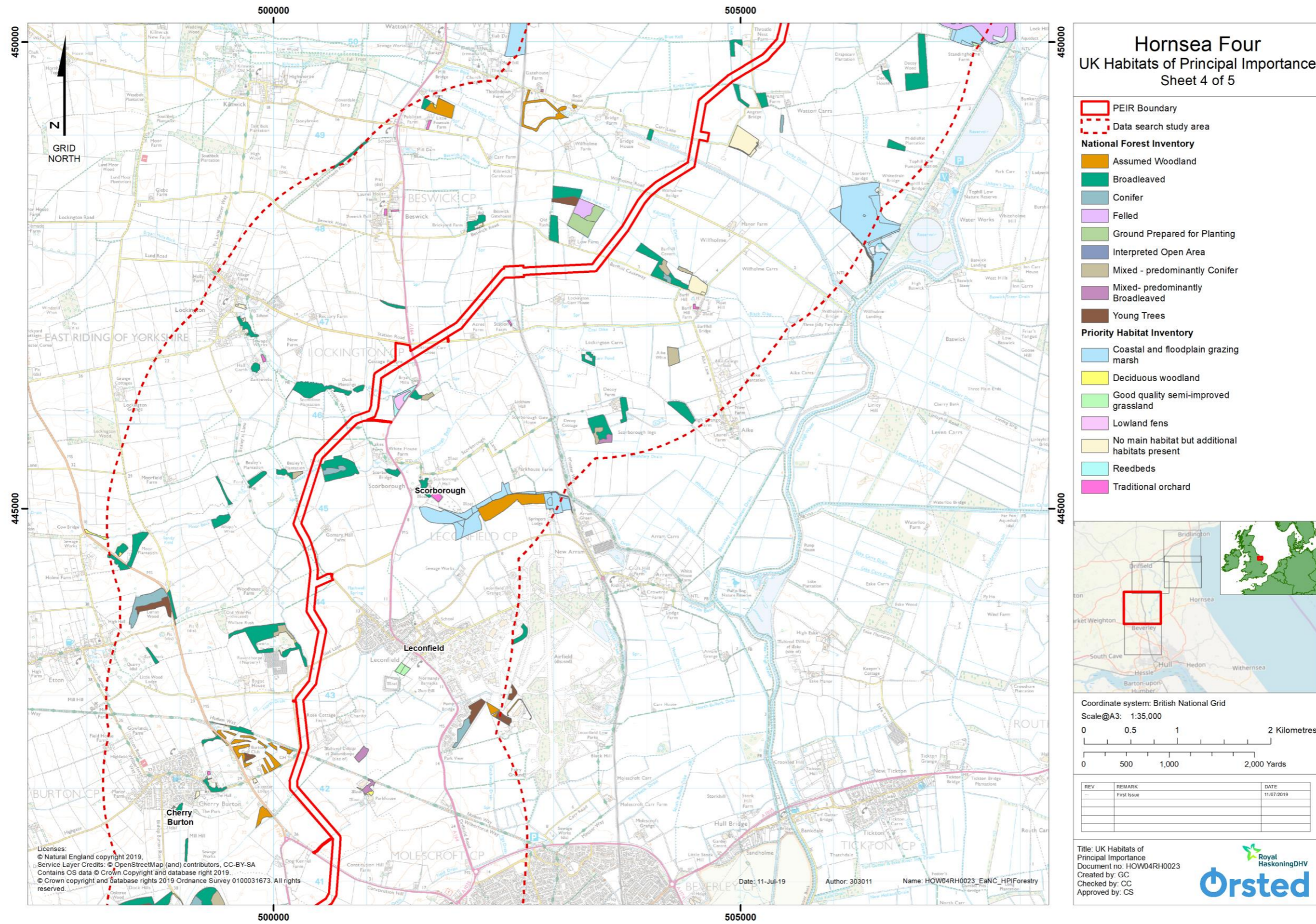


Figure 3.14: UK Habitats of Principal Importance and National Forestry Commission Data Sheet 4 (Not to Scale).

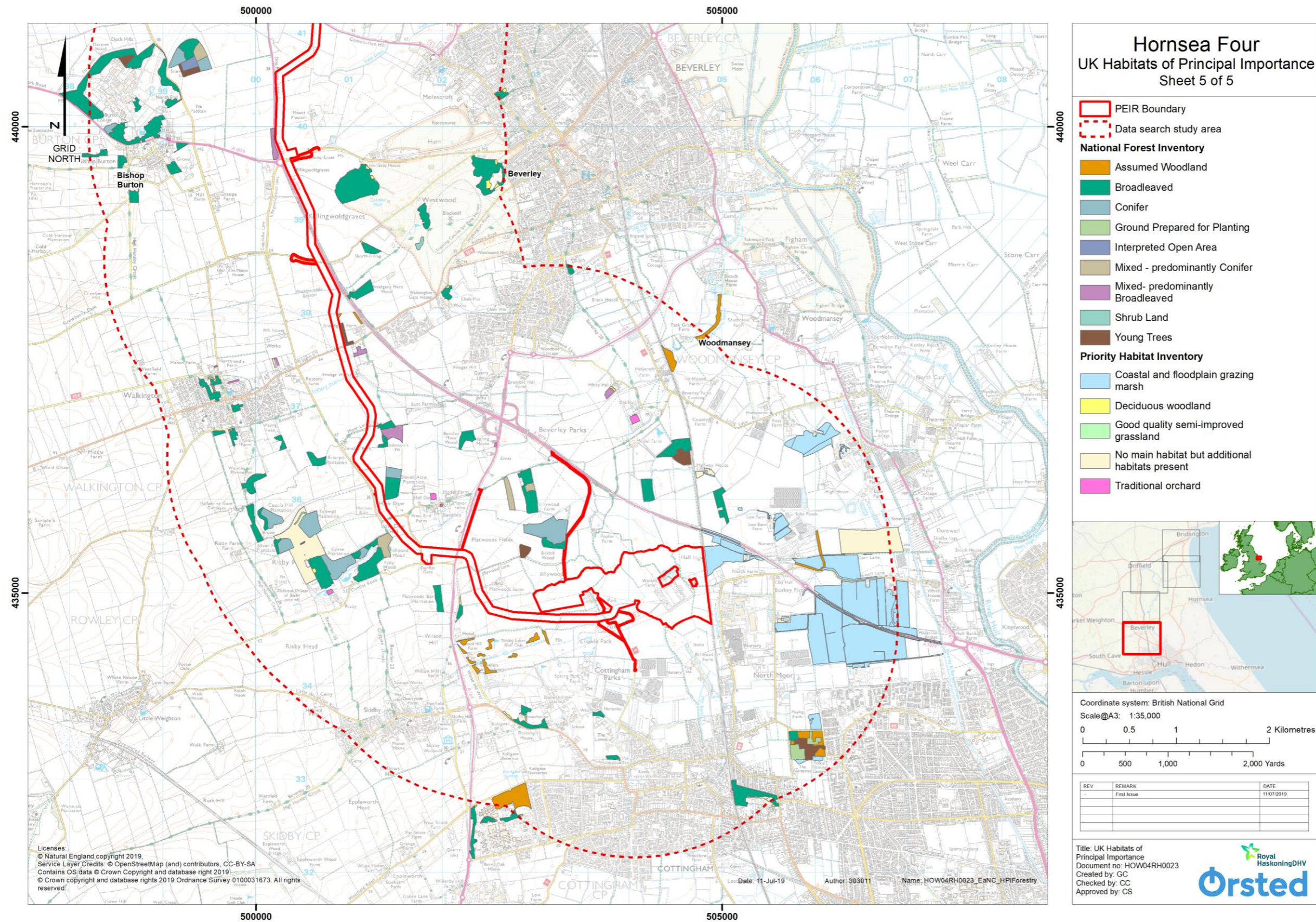


Figure 3.15: UK Habitats of Principal Importance and National Forestry Commission Data Sheet 2 (Not to Scale).

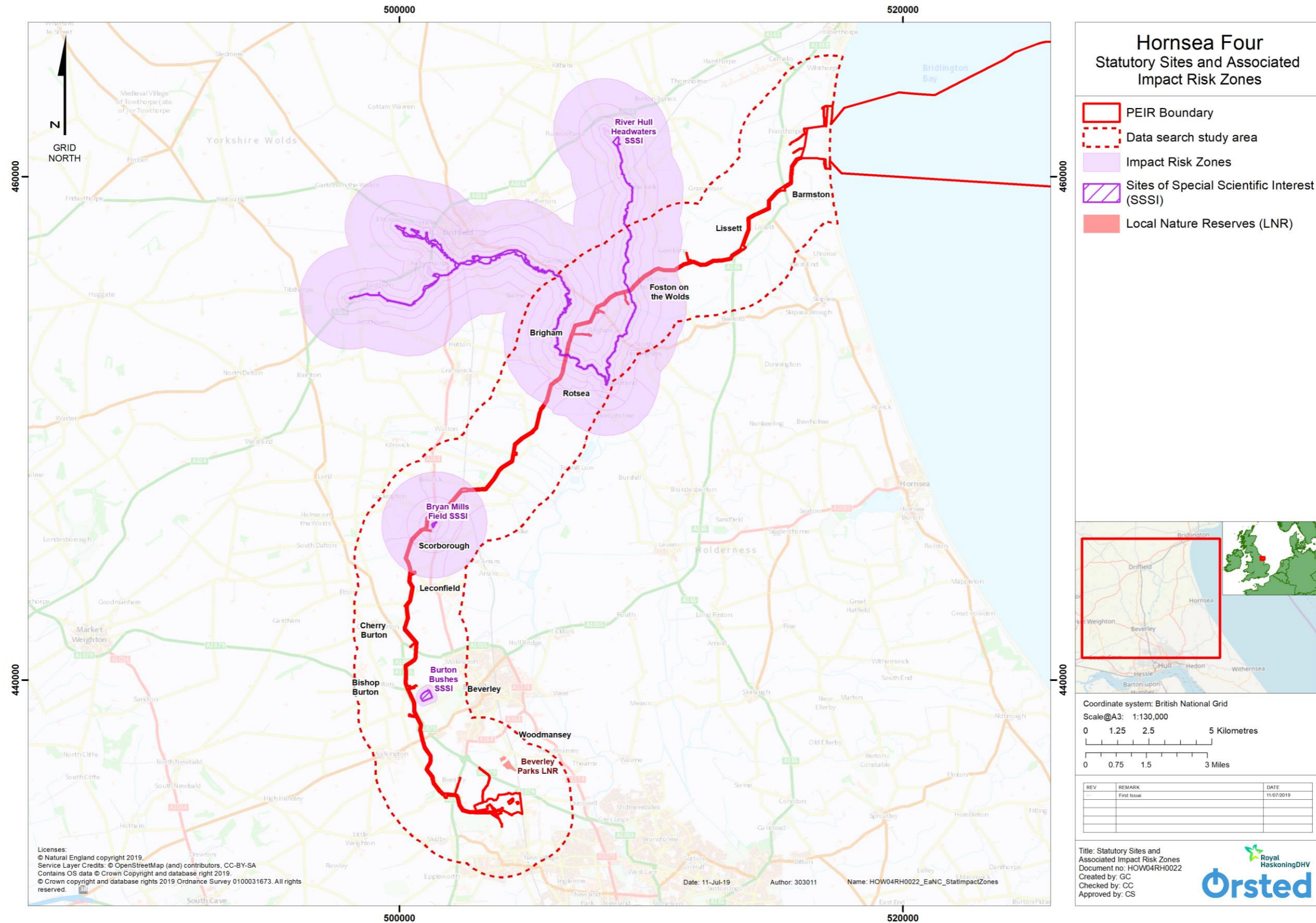


Figure 3.16: SSSI Impact Risk Zones (IRZ) in relation to the Hornsea Four Onshore PEIR boundary (Not to Scale).

3.7.3. Terrestrial habitats

3.7.3.1 The baseline presented below has been informed by the data gathered during the February 2019 Extended Phase 1 Habitat Survey. Where areas were not granted landowner access at the time of the Extended Phase 1 Habitat Survey, these areas have been described using high resolution aerial imagery. This aerial data was distributed to stakeholders during the Evidence Plan process. Full details of the habitats present are provided within [Volume 6, Annex 3.1: Extended Phase 1 Habitat Survey Report](#). Features of interest are described in target notes, which are referenced using a numbering system. The locations of the habitats described below and the target notes (TN) are shown on [Figure 3.17 to Figure 3.41](#) and further details are provided in [Appendix 1 of Volume 6, Annex 6.3.1: Extended Phase 1 Habitat Survey Report](#).

Woodland

3.7.3.2 There is approximately 3 ha of woodland within the EP1HS study area, consisting of broadleaved semi-natural woodland and broadleaved or coniferous plantation woodland. A total of nine areas of broadleaved semi-natural woodland, and four areas of plantation woodland were recorded. These ranged from large areas of woodland through to small isolated pockets at field margins and along roads.

3.7.3.3 Broadleaved woodland typically consisted a mix of ash *Fraxinus excelsior*, sycamore *Acer pseudoplatanus* and oak *Quercus robur* with typical understorey and ground flora species including thistle *Cirsium vulgare*, hawthorn *Crataegus monogyna*, bramble *Rubus fruticosus* and common nettle *Urtica dioica*. Coniferous woodland species typically included Scots pine *Pinus sylvestris*.

3.7.3.4 Plantation woodland typically included sweet chestnut *Castanea sativa*, oak, Scots pine and hazel *Corylus avellana* with understorey and ground flora species consisting mainly of bramble and common nettle.

Scrub

3.7.3.5 Approximately 5 ha of scrub was recorded within the EP1HS study area during the February 2019 survey, covering a total of 14 areas. These areas represented a range of habitat sub-types including transitional habitat between woodland and grassland, boundary features, waste ground, field margins and watercourse margins. Species present included bramble, gorse *Ulex spp.*, common nettle, common hogweed *Heraclium sphondylium*, cow parsley *Anthriscus sylvestris* and cleavers *Galium aparine*.

Hedgerows

3.7.3.6 A total of 57 hedgerows were recorded within the EP1HS study area, totalling approximately 7 km in length of hedgerow.

3.7.3.7 Of the 57 hedgerows recorded during the EP1HS, the majority (34) are species-poor intact hedgerows. However, species-poor hedgerows with trees (12), species-poor defunct

hedgerows (5), species-rich hedgerows with trees (5) and species-rich intact hedgerows (1) were also recorded.

- 3.7.3.8 Species rich hedgerows typically consisted of shrub and tree species including hawthorn, oak, ash, sycamore, beech *Fagus sylvatica*, goat willow *Salix caprea*, hazel, field maple *Acer campestre*, ivy *Hedera helix*, holly *Ilex aquifolium*, with ground flora typically consisting of common nettle, bramble, cow parsley, red-dead nettle *Lamium purpureum*, cleavers, common hogweed, broad leaf dock *Rumex obtusifolius*. Species poor hedgerows were characterised by fewer than five woody species within a 30 m stretch and were typically dominated by hawthorn.

Improved grassland

- 3.7.3.9 Improved grassland was recorded in four locations within the Hornsea Four ecology and nature conservation study area, approximating to a total of 5.5 ha. This habitat was formed of short sward grasses with areas of scrub vegetation typically being used for either grazing or paddocks.

Poor semi-improved grassland

- 3.7.3.10 Poor semi-improved grassland was recorded in eight locations within the Hornsea Four ecology and nature conservation study area, approximating to a total of 11.5 ha of this habitat. These areas were comprised of coarse ruderal grass and herb species such as cock's foot *Dactylis glomerata*, broadleaf dock and white clover *Trifolium repens*.

Standing and running water

- 3.7.3.11 There is a total of 73 watercourses (i.e. ditches and rivers) within the EP1HS study area and within areas reviewed using aerial imagery, these included both field margin ditches and running water.

- 3.7.3.12 Furthermore, a total of 85 ponds were identified to be present within the great crested newt study area.

Arable land

- 3.7.3.13 The largest habitat within the EP1HS study area by area is arable land (373 ha). At the time of the EP1HS survey these ranged from fields that were in crop (such as *brassica spp.*), those which were ploughed and those that remained to have a winter cover.

3.7.4. Summary

- 3.7.4.1 **Table 3.9** summarises the key habitats which were recorded within the EP1HS study area during the February 2019 EP1HS.

Table 3.9: Habitat footprints within the updated EP1HS study area.

JNCC Habitat Code	Habitat type	Area (ha) within EP1HS study area	Percentage (%) of habitat type of the total onshore area
A1.1.1	Broadleaved woodland – semi-natural	2	0.19
A1.1.2	Broadleaved woodland – plantation	0.8	0.07
A1.3.2	Mixed woodland – plantation	1.3	0.12
A2.1	Scrub – dense/continuous	4.9	0.46
B6	Poor semi-improved grassland	11.6	1.07
B4	Improved grassland	5.6	0.52
J1.1	Cultivated/disturbed land – arable	373	34.29
JNCC Habitat Code	Habitat type	Total Length (m) within EP1HS study area	Percentage (%) of habitat type of the total onshore area
J2.1.1	Intact hedge – species-rich	77	0.45
J2.1.2	Intact hedge – species-poor	4,378	25.88
J2.2.1	Defunct hedge – species-rich	534	3.16
J2.3.1	Hedge with trees – species-rich	278	1.64
J2.3.2	Hedge with trees – species-poor	1,580	9.34
J2.6	Dry ditch	721	4.26

3.7.5. Protected, Notable and Invasive Species

3.7.5.1 This section provides a summary of the key species recorded within the EP1HS study area, drawing on the information obtained from the following data sources:

- NEYEDC Biological Records;
- [Volume 6, Annex 3.1: Extended Phase 1 Habitat Survey Report](#);
- [Volume 6, Annex 3.2: Onshore Ornithology – Wintering and Migratory Birds Survey Report](#)
- [Volume 6, Annex 3.4: Great Crested Newt Survey Report](#); and
- [Volume 6, Annex 3.10: Badger Survey Report](#)

3.7.5.2 The EP1HS data is shown in [Figure 3.17](#) to [Figure 3.41](#).

Badgers

3.7.5.3 No records of badgers were returned from the biological records data search from NEYEDC. One badger sett, a potentially disused outlier sett, and scattered field signs (such as tracks, latrines and snuffle holes) were recorded within the EP1HS study area during the updated EP1HS.

3.7.5.4 Approximately 50% of the EP1HS study area was assessed for signs of badger activity, due to landowner restrictions during the updated EP1HS. A further badger presence/absence

survey will be undertaken in 2019 (subject to landowner access agreement), the findings of which will be reported within the Hornsea Four ES.

- 3.7.5.5 No impact assessment has been undertaken within this Chapter in respect to badgers as a full and robust baseline has not been established, as stated in [Section 3.1](#) and as agreed with Natural England, YWT, ERYC and the RSPB via an evidence plan meeting on 8th April 2019. This impact will be fully assessed within the Hornsea Four ES, to be provided with the DCO application.

Birds

- 3.7.5.6 The NEYEDC records returned data of a total of 223 bird species within the 5 km Hornsea Four ecology and nature conservation study area. Of those records, a total of 11 were recorded within the EP1HS study area. Of the 11 records within the EP1HS study area, none are listed under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), four are listed on the 'red list' of threatened species in the Birds of Conservation Concern (BoCC) 4 analysis (Eaton et al, 2015), and one is listed on the BoCC4 'amber list' of threatened species.
- 3.7.5.7 One BoCC4 'red list' bird was observed during the updated EP1HS, a skylark *Alauda arvensis* in song flight ([Figure 3.19](#)).
- 3.7.5.8 All hedgerows, isolated trees, grassland, scrub and woodland habitats identified during the updated EP1HS provide suitable nesting habitat for protected, notable and common species birds.
- 3.7.5.9 An over-wintering bird survey was undertaken between November 2018 and March 2019 (inclusive), and a further survey effort will be undertaken between May and June 2019 (inclusive) for breeding birds. Due to landowner access restrictions, not all survey points were accessible throughout the survey period, full details on the survey schedule and completion rates can be found in Table 3.1 of [Volume 6, Annex 3.2: Onshore Ornithology – Wintering and Migratory Birds Survey Report](#).
- 3.7.5.10 The over-wintering bird survey consisted of both a VP survey within the landfall, onshore ECC and a walkover survey within the habitats surrounding the OnSS. A full methodology is provided in [Volume 6, Annex 3.2: Onshore Ornithology – Wintering and Migratory Birds Survey Report](#). The breeding bird survey will follow a similar methodology to the over-wintering bird survey with results to be included within the Hornsea Four ES with the final DCO application.
- 3.7.5.11 Results from the over-wintering bird survey show assemblages of birds that are expected within the habitats found in the survey area. Taking into consideration the wider area of Holderness and the River Hull valley, these included a number of farmland passerines, ducks, geese, waders and migratory thrushes. Bird assemblages recorded included a number of BoCC4 'red list' and BoCC4 'amber list' species, with some noted as being of regional value, with the caveat that such wintering bird assemblages are reflective and characteristic of the wider area.

- 3.7.5.12 The presence of a flock of 66 Corn bunting *Emberiza calandra* is of some note, given the decline of the species within the UK. However, it should be noted that Holderness is one of the strongholds of the species in the UK (Balmer et al, 2013). Recordings of numerous numbers of Fieldfare *Turdus pilaris* and Redwing *Turdus iliacus* throughout the survey period is to be expected during the winter, with the arrival of large wintering flocks of these species and thrushes from Scandanavia.
- 3.7.5.13 The presence of Lapwing *Vanellus vanellus*, a BoCC4 'red list' species, is to be expected as this species will utilise arable fields during the autumn and winter. Given the distance (approximately 9 km at its closest point) from the survey area to the Humber Estuary SPA it is not considered that the occurrence of this species has significant linkage to the populations found within the SPA.
- 3.7.5.14 In addition to the above, the over-wintering bird survey noted the presence of a number of species that are specifically protected under Schedule 1 of the Wildlife and Countryside Act, 1981 (see [Section 3.3.2](#)). [Table 3.10](#) lists the Schedule 1 species birds that have been recorded during the over-wintering bird survey effort.
- 3.7.5.15 Further information regarding the breeding status of the bird species listed in [Table 3.10](#) will be collected during the breeding bird survey. These surveys will be completed by the end of June 2019. The full findings of which will be reported within the Hornsea Four ES.

Table 3.10: Schedule 1 (WCA, 1981) species recorded during the 2018/2019 over-wintering bird survey.

Species	Breeding presence
Red Kite <i>Milvus milvus</i>	Potential breeder (possible but not known to breed locally to the onshore ECC/OnSS search area)
Green Sandpiper <i>Tringa ochropus</i>	Over-wintering / passage only
Barn Owl <i>Tyto alba</i>	Potential breeder (likely but over 500 m from the onshore ECC and not within the OnSS search area)
Kingfisher <i>Alcedo atthis</i>	Potential breeder (likely but not necessarily within the onshore ECC/OnSS search area)
Merlin <i>Falco columbarius</i>	Potential breeder (possible but unlikely)
Peregrine Falcon <i>Falco peregrinus</i>	Potential breeder (very likely with active pair in the OnSS search area)
Firecrest <i>Regulus ignicapilla</i>	Potential breeder (extremely unlikely)
Fieldfare <i>Turdus pilaris</i>	Over-wintering only
Redwing <i>Turdus iliacus</i>	Over-wintering only
Brambling <i>Fringilla montifringilla</i>	Over-wintering only

Bats

- 3.7.5.16 A total of 104 records of bats within bat study area was returned from NEYEDC. Of those records, one result was recorded within the EP1HS study area. Records of bats returned from NEYEDC were spread across five species of bats, with common pipistrelle *Pipistrellus pipistrellus* being the most frequently encountered.

3.7.5.17 All features (i.e. trees, buildings, structures) noted during the updated EP1HS were assessed in accordance with Bat Conservation Trust (BCT) guidance (Collins, 2016), from ground level and using binoculars, for their suitability to support roosting bats. In total, 82 features were assessed for their suitability to support roosting bats:

- Negligible – 23;
- Low – 28;
- Moderate – 28; and
- High – 3.

3.7.5.18 Additionally, within areas reviewed using aerial imagery, a further 15 potential bat roost features were noted, and will be subject to a ground-level assessment prior to the emergence/re-entry survey. These surveys will be subject to land access agreements.

3.7.5.19 Full details of the roost assessment are provided in [Volume 6, Annex 3.1: Extended Phase 1 Habitat Survey Report](#). Emergence/re-entry surveys commenced in June 2019, and will continue until October 2019 (inclusive), and until they are completed more detailed information regarding the roosting bat resource is unknown. The phase 2 bat survey baseline will be provided with the Hornsea Four ES with the DCO application.

3.7.5.20 In addition to trees and structures, all linear features (e.g. watercourses, hedgerows) were assessed in terms of their suitability to support commuting or foraging bats, in accordance with BCT guidelines (Collins, 2016). In total, 97 features were assessed for their suitability to support commuting or foraging bats:

- Negligible – six;
- Low – 45;
- Moderate – 45; and
- High – one.

3.7.5.21 A further 14 habitat areas potentially used by commuting/foraging bats have been identified following a review of aerial data. In line with the approach to the additional bat roost features, these 14 areas will be visited prior to the commencement of the bat activity and static detector survey, in order to assess their suitability (dependant on landowner access). As bat activity transect and static detector surveys are not yet completed, more detailed information regarding the commuting and/or foraging bat resource is not yet known.

3.7.5.22 No impact assessment has been undertaken within this Chapter in respect to bats as a full and robust baseline has not been established. This impact will be fully assessed within the Hornsea Four ES with the DCO application.

Water voles

- 3.7.5.23 A total of 126 records of water vole within a 2km Hornsea Four ecology and nature conservation study area were returned from NEYEDC. Of those records, a total of 17 results were recorded within EP1HS study area.
- 3.7.5.24 During the updated EP1HS, a total of 37 watercourses (i.e. field margin drains, ditches and river systems) were recorded. A further 36 watercourses were identified from the aerial imagery, these 36 watercourses will be visited prior to the water vole survey to assess their suitability (dependant on landowner access).
- 3.7.5.25 In order to fully understand the water vole resource within the EP1HS study area, and taking into consideration comments from stakeholders regarding habitat suitability (see [Section 3.4](#), all watercourses containing water have been scoped into the water vole survey that will / have been be undertaken in May and September 2019).
- 3.7.5.26 No impact assessment has been undertaken within this Chapter in respect to water vole as a full and robust baseline has not been established. This impact will be fully assessed within the Hornsea Four ES with the DCO application.

Otters

- 3.7.5.27 All records of otters returned from NEYEDC were situated outside of the EP1HS study area, but within the wider data search study area.
- 3.7.5.28 Eleven watercourses were noted during the updated EP1HS as potentially providing suitable habitat for otters within the EP1HS study area. No signs of otter activity were recorded. However, these 11 watercourses will be subject to an otter presence/absence survey, to be undertaken concurrently with the water vole presence/absence survey in May and July 2019.
- 3.7.5.29 An additional 36 watercourses will be subject to an assessment of suitability for otter prior to the water vole/otter survey (dependant on landowner access).
- 3.7.5.30 No impact assessment has been undertaken within this Chapter in respect to otters as a full and robust baseline has not been established. This impact will be fully assessed within the Hornsea Four ES with the DCO application.

Great crested newts

- 3.7.5.31 A total of 18 records of great crested newts were returned from NEYEDC, all of which were outside of the EP1HS study area but within a 2 km buffer.
- 3.7.5.32 Ordnance Survey (OS) mapping was reviewed and a total of 84 ponds were identified to be within, and up to 250 m from the onshore PEIR boundary. An additional pond was recorded during the 2019 GCN environmental DNA (eDNA) survey. Therefore, in total 85 ponds formed the basis of the GCN eDNA survey, that was undertaken in April and June 2019.

- 3.7.5.33 Access was granted to a total of 74 ponds (out of the 85 ponds identified) in April and June 2019. Of those ponds, a total of 42 were sampled for eDNA, 15 ponds were dry, 14 ponds were no longer present, and one pond was inaccessible due to the presence of livestock. Furthermore, two ponds were inaccessible due to electric fencing and locked gates, however these were noted as being large fishing ponds with high concentrations of geese, swans and ducks present within the surrounding grassland. Consequently, these two ponds were assessed as being unsuitable for GCN and have been scoped out of any further consideration and/or survey.
- 3.7.5.34 The results of the eDNA survey completed showed that three ponds returned a positive result for the presence of great crested newt DNA. Analysis results are still outstanding for four of the 42 ponds surveyed in April and June 2019. One pond returned an inconclusive result and the remaining 34 ponds returned a negative result.
- 3.7.5.35 The coverage of the great crested newt eDNA survey included a total of 16 ponds within a 250 m buffer of the OnSS, plus 26 ponds within a 250 m buffer of the onshore ECC and landfall. It should be noted that no known ponds are predicted to be lost during the construction of Hornsea Four. Two of the ponds that tested positive for the presence of great crested newt (Pond_A08 and Pond_A11) are situated approximately 450 m from the onshore ECC but are within 250 m of an existing road that will be used as an access road for the project. There are no clear ecological pathways linking the two ponds and the onshore ECC. The third pond (Pond_A32) is approximately 200m from the onshore ECC, within an ornamental pond in the grounds of a bottling factory. Hornsea Four is currently undertaking discussions with Natural England with regard to appropriate mitigation measures with regard to GCN and this will be fully reported with the Hornsea Four ES.
- 3.7.5.36 Until an agreement has been reached with Natural England on the approach to be taken for those ponds where no land access has been granted to date, no impact assessment has been undertaken within this Chapter in respect to great crested newts. It is intended that the approach for great crested newts will be agreed as part of the continuing Evidence Plan process with Natural England, with the full assessment and appropriate mitigation measures reported within the Hornsea Four ES, with the DCO application.

Reptiles

- 3.7.5.37 During the updated EP1HS, all habitats suitable for reptiles were noted. This included habitat mosaics offering hibernation, basking and foraging opportunities as well as discrete locations of rank grassland and scrub. One reptile record was returned from NEYEDC, a grass snake *Natrix natrix* that was recorded outside the EP1HS study area but within the data search study area. Additionally, no substantial areas of habitat suitable for reptiles was recorded during the updated EP1HS. Therefore, in contrast to the Scoping Report (Orsted 2018), no reptile surveys are proposed to be undertaken. This was agreed with Natural England, YWT, ERYC and the RSPB via an evidence plan meeting on 8th April 2019

Fish

3.7.5.38 No baseline data has been collected to identify the presence/likely absence of fish species in watercourses within the Hornsea Four onshore boundary. Therefore, no impact assessment has been undertaken. Further information is provided in [Table 3.11](#).

3.7.6. Predicted future baseline

3.7.6.1 The ecological baseline described in the preceding sections provides a summary of the habitats and species present within a 2 km buffer (5 km for bird and bat species) of the Hornsea Four onshore boundary, inclusive. In broad terms, the Hornsea Four onshore boundary includes typical lowland UK habitat types comprising largely arable farmland with hedgerows, pockets of woodland, standing and flowing water. The key areas for notable species and habitats are typically designated sites and parcels of woodland and poor semi-improved grassland, with species in other areas relying strongly on ecological corridors such as watercourses and hedgerows for connectivity across arable farmland.

3.7.6.2 The overall trend in the UK is for a decline in priority species since the 1970s, although the gradient of this decline has lessened since 2000 (Defra, 2017). This overall trend is driven by certain species groups, with moths in particular declining by approximately 80% over this period (Defra, 2017). Habitat connectivity has remained static since 1990. Indicators of ecosystems services provision (pollinators) have also remained static over the short term. Perhaps most relevant to the onshore PEIR boundary, is that species associated with farmland have declined over the short and long term, with farmland birds and butterflies both in decline. Where mammal (bats) numbers increased from 1999-2015 the increase has levelled out from the period 2010-2015 (Defra, 2017).

3.7.6.3 Attempts to manage trends in biodiversity are delivered through EU, UK and local legislation and policies. The UK has transposed protection for European protected species and habitats into UK law, and also provides domestic legislation for species and sites not covered by European protection. These species will continue to be protected under the forthcoming EU Withdrawal Bill. The UK's approach to managing Biodiversity Loss is set by 'Biodiversity 2020: a strategy for England's wildlife and ecosystem services' (Defra, 2011). The policies set out under this strategy seek to reverse these declining trends. Data is still being gathered to determine success of these measures. However, for the time being it appears that declining trends in biodiversity for the habitats and species present within the Hornsea Four onshore boundary may continue. Climate change has had a relatively small impact on the UK's biodiversity to date, however impacts to species ranges, population sizes and the timing of biological events (such as hibernation, flowering plants etc.) are expected to become more significant over time, with further data required to inform those impacts (Defra, 2011). Consequently, it is assumed that the ecological baseline within Hornsea Four onshore boundary will continue to change over time as measures to try and manage the decline in protected species and habitats continue.

3.7.7. Data Limitations

3.7.7.1 The key data limitation in relation to the baseline data is the level of landowner access that has been available when establishing a robust baseline. Approximately 50% of the Hornsea

Four onshore PEIR boundary was covered during the updated EP1HS in February 2019, with the remaining habitats being reviewed using high-resolution aerial data. An additional updated EP1HS is planned in 2019, as further landowner agreements are now in place. This additional updated EP1HS will inform the Hornsea Four ES.

- 3.7.7.2 Some habitats could not be fully accessed during the updated EP1HS, due to physical barriers preventing entry, for example dense scrub. However, generally these areas were small, discrete locations (such as dense bramble covering ditches) and were encountered infrequently. In the few locations where they were encountered, they were recorded as potentially providing field signs which could not be picked up during the field survey (e.g. the noting of habitats suitable for reptile species as well as ensuring that all suitable ditches for water vole and/or otter were scoped in for the subsequent water vole/otter presence/absence surveys).
- 3.7.7.3 The updated EP1HS was undertaken in February 2019. Although this is outside the optimal survey period for identifying ground flora species and habitat communities, however the majority of habitats encountered during the updated EP1HS was consistent with those expected of agricultural landscapes and colonised by identifiable species (i.e. scrub and hedgerows dominated by bramble and hawthorn). For areas of habitat such as 'poor semi-improved grassland' sufficient evidence of early flowering key indicator species (i.e. herbaceous species and some grasses) was found enabling the successful identification of habitat communities. It was therefore considered by the terrestrial ecology survey team that the survey was robust and suitable to characterise the site for the purposes of an EIA.
- 3.7.7.4 Whilst the survey team made the utmost effort to cover every habitat and pick up all field signs present during the updated EP1HS, on occasion some field signs can be missed. However, despite this, the data presented in this report is considered to provide an accurate description of the habitats within the EP1HS study area. Further surveys will allow for update of the baseline appropriately before submission of the ES.
- 3.7.7.5 In addition, as addressed previously in [Section 3.7](#), Phase 2 surveys have been disrupted by landowner access. With land access now available, phase 2 surveys will be completed to the maximum possible extent prior to the submission of the DCO and any related impact assessments will be reported on in the ES. Furthermore, pre-construction surveys have been committed to, where relevant, as outlined in [Volume F2, Chapter 3: Outline Ecological Management Plan](#).

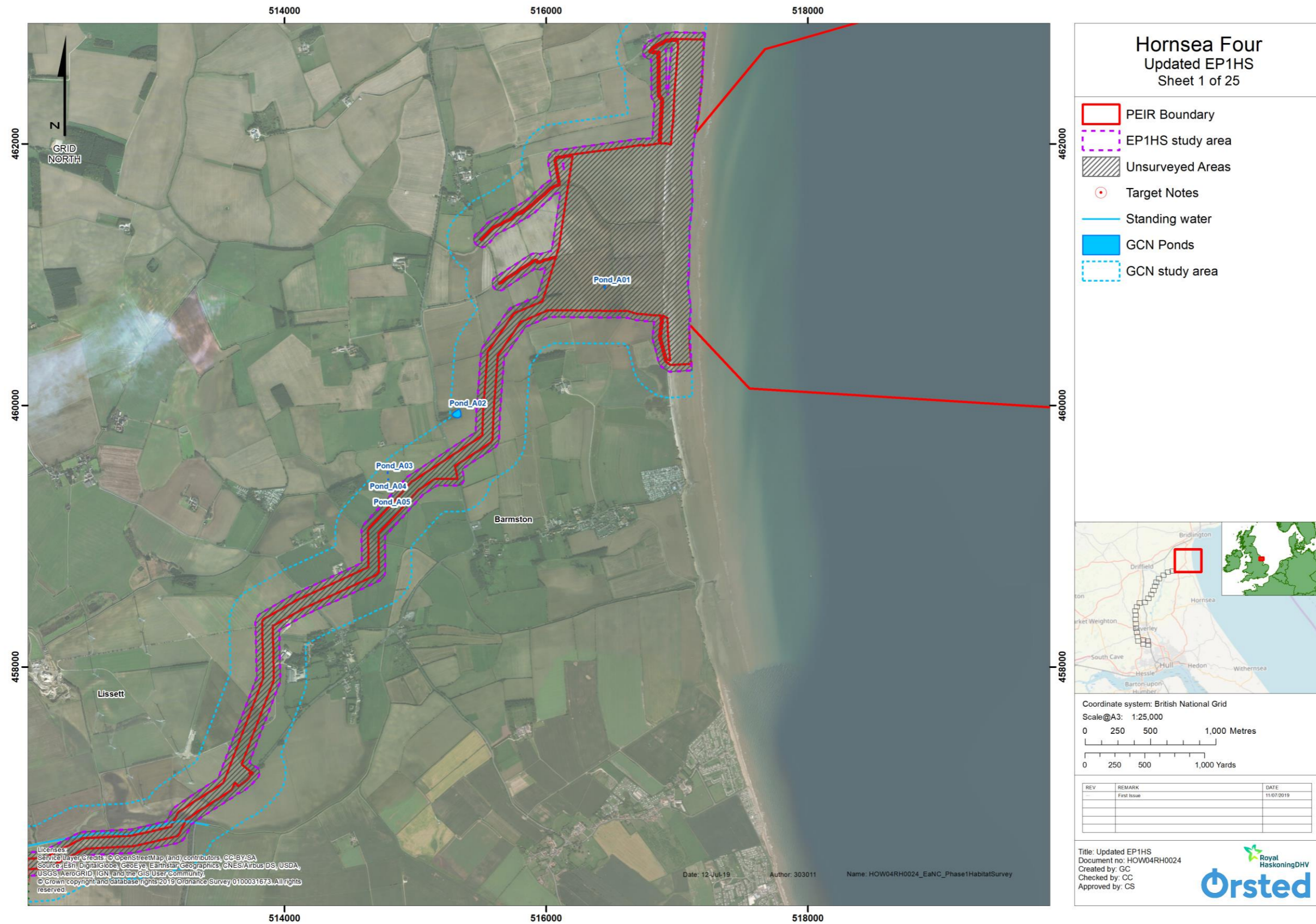


Figure 3.17: Updated Extended Phase 1 Habitat Survey Mapping Sheet 1 (Not to Scale).



Figure 3.18: Updated Extended Phase 1 Habitat Survey Mapping Sheet 2 (Not to Scale).



Figure 3.19: Updated Extended Phase 1 Habitat Survey Mapping Sheet 3 (Not to Scale).

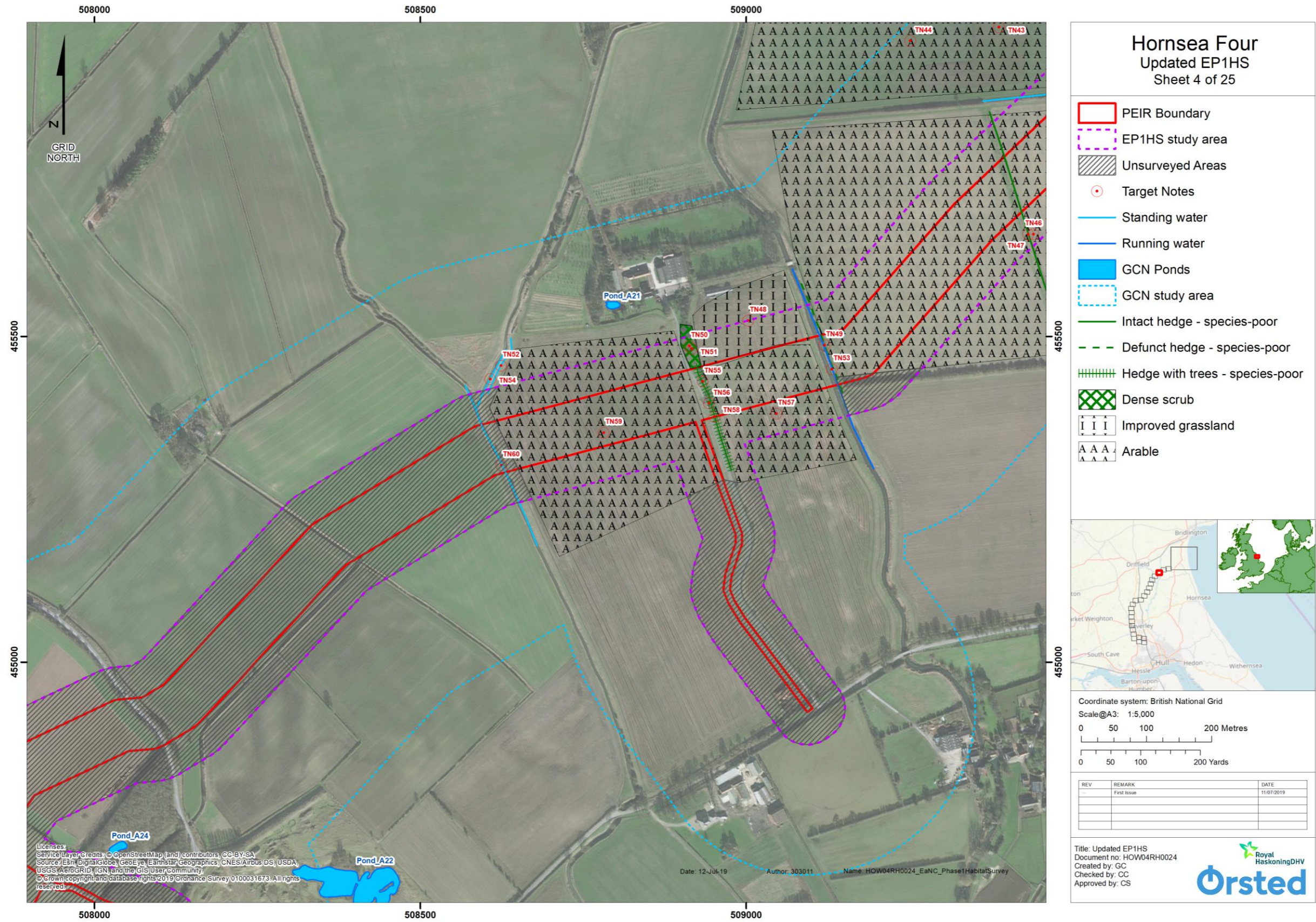


Figure 3.20: Updated Extended Phase 1 Habitat Survey Mapping Sheet 4 (Not to Scale).



Figure 3.21: Updated Extended Phase 1 Habitat Survey Mapping Sheet 5 (Not to Scale).

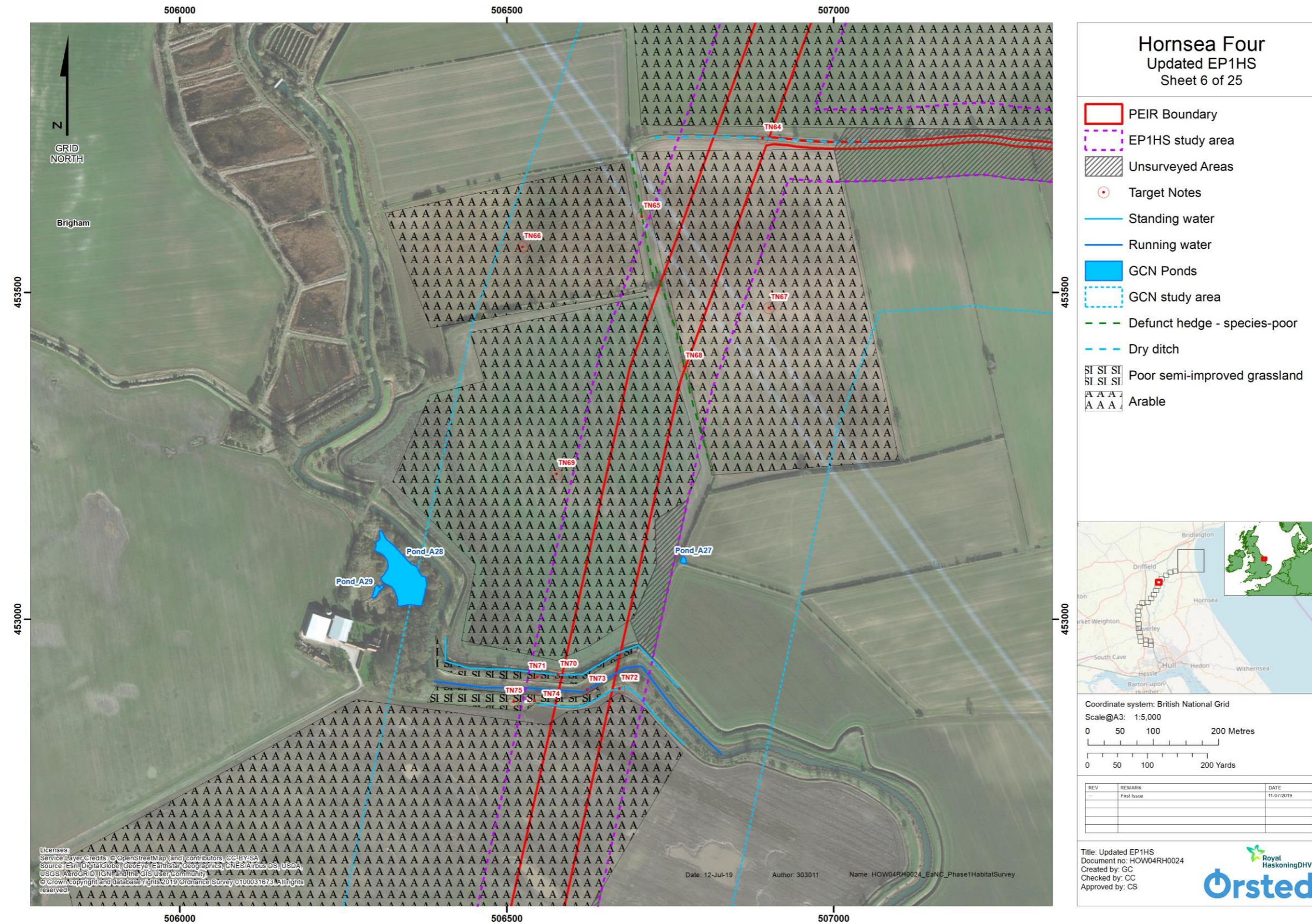


Figure 3.22: Updated Extended Phase 1 Habitat Survey Mapping Sheet 6 (Not to Scale).

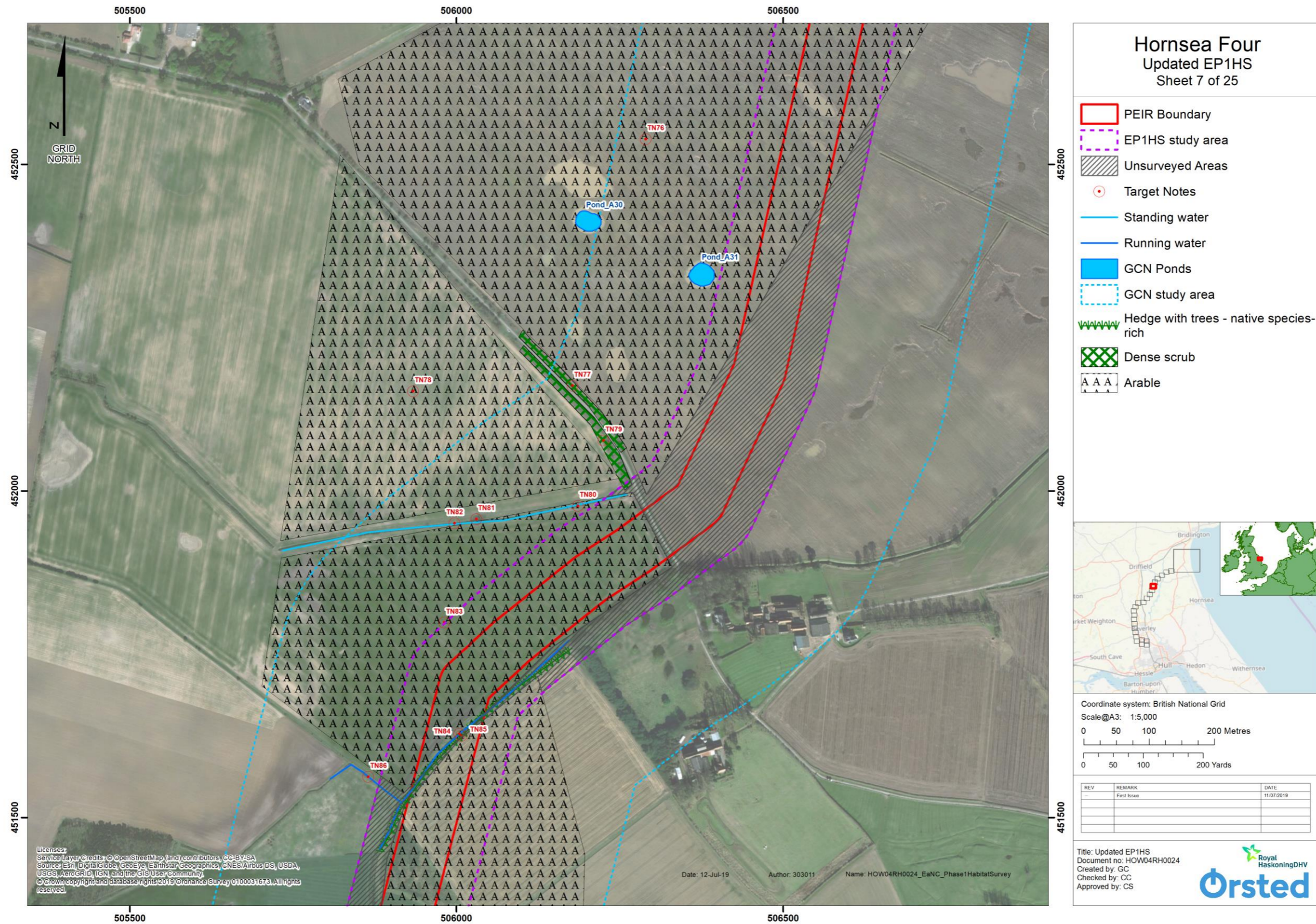


Figure 3.23: Updated Extended Phase 1 Habitat Survey Mapping Sheet 7 (Not to Scale).



Figure 3.24: Updated Extended Phase 1 Habitat Survey Mapping Sheet 8 (Not to Scale).



Figure 3.25: Updated Extended Phase 1 Habitat Survey Mapping Sheet 9 (Not to Scale).

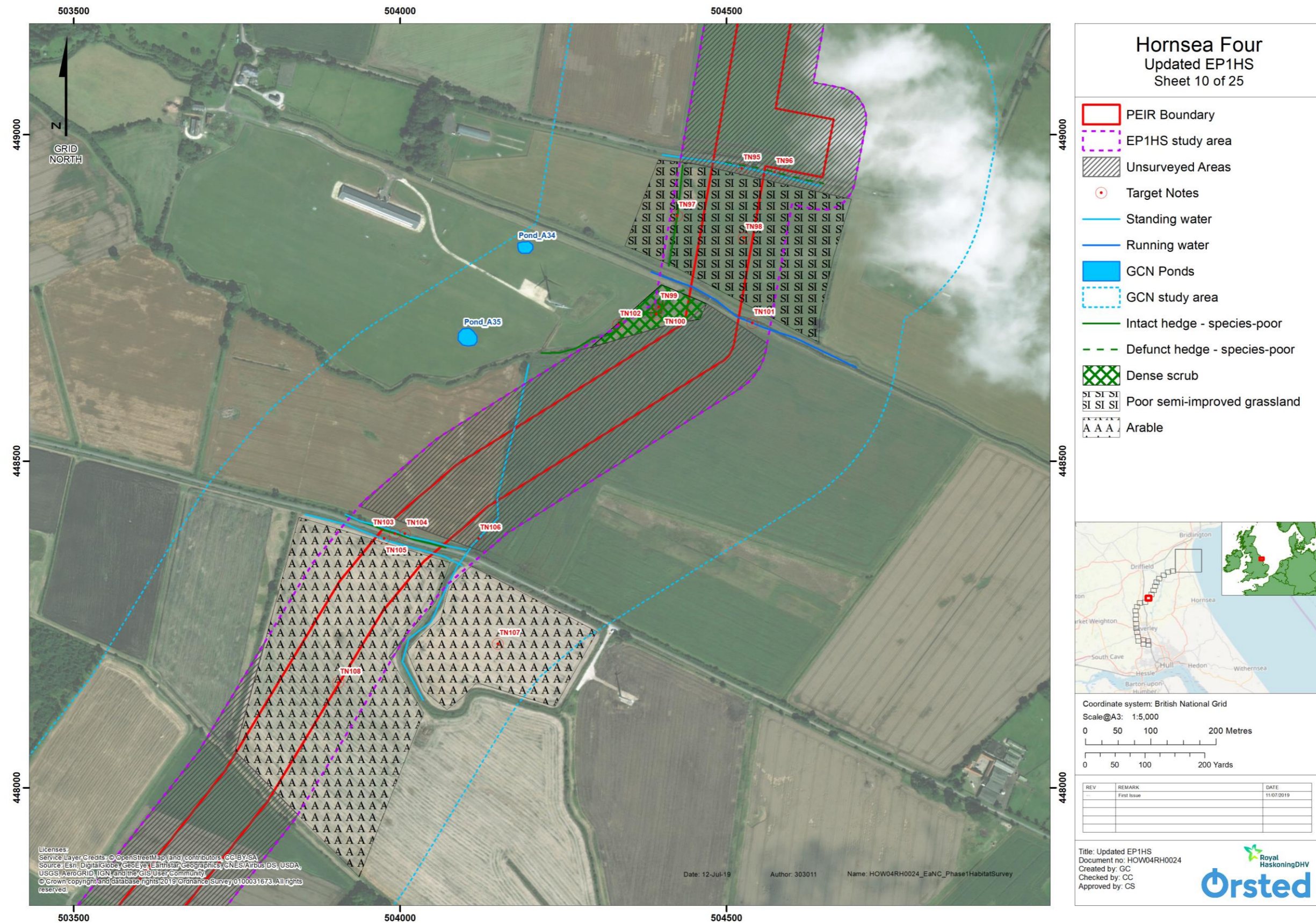


Figure 3.26: Updated Extended Phase 1 Habitat Survey Mapping Sheet 10 (Not to Scale).

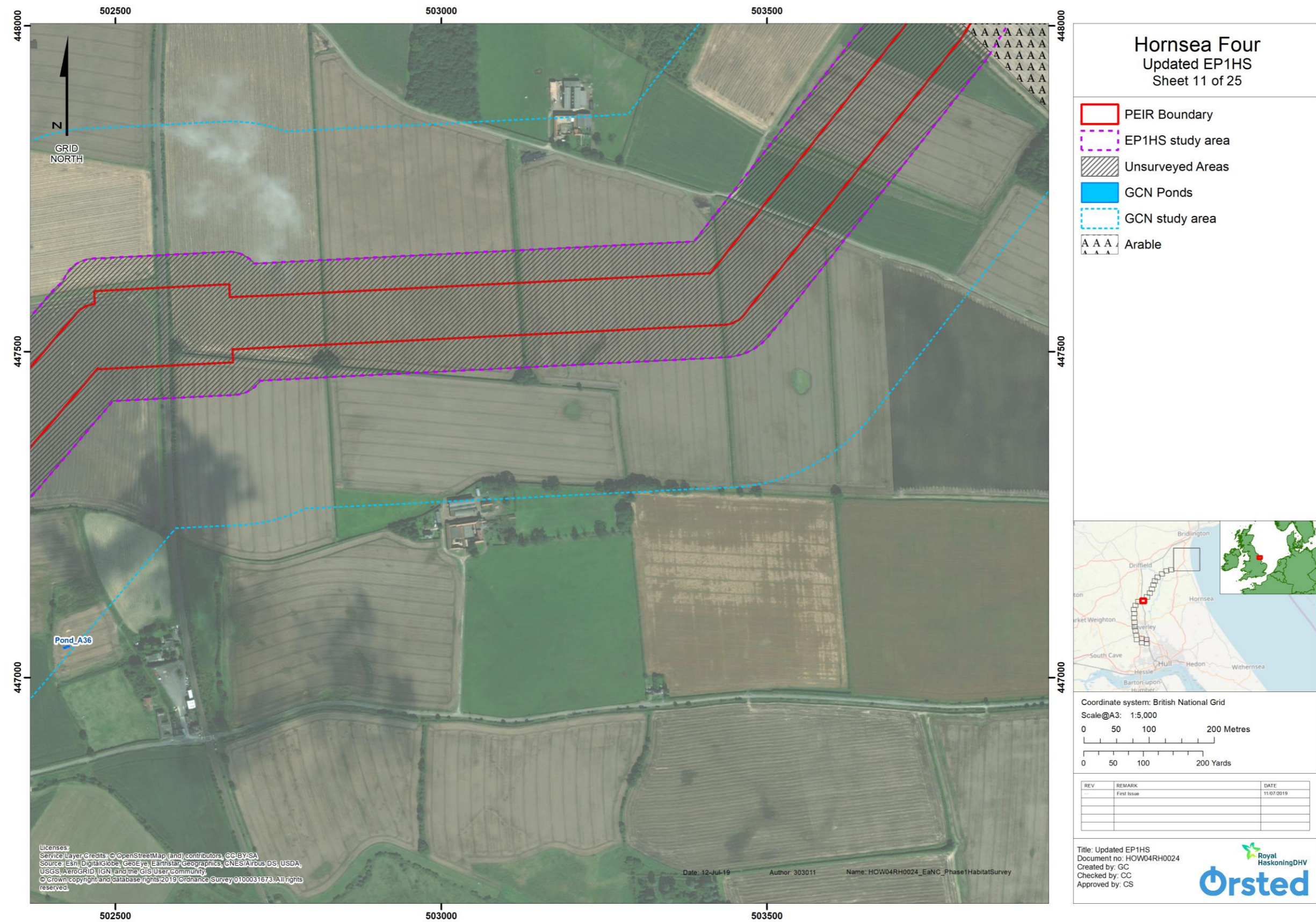


Figure 3.27: Updated Extended Phase 1 Habitat Survey Mapping Sheet 11 (Not to Scale).



Figure 3.28: Updated Extended Phase 1 Habitat Survey Mapping Sheet 12 (Not to Scale).



Figure 3.29: Updated Extended Phase 1 Habitat Survey Mapping Sheet 13 (Not to Scale).

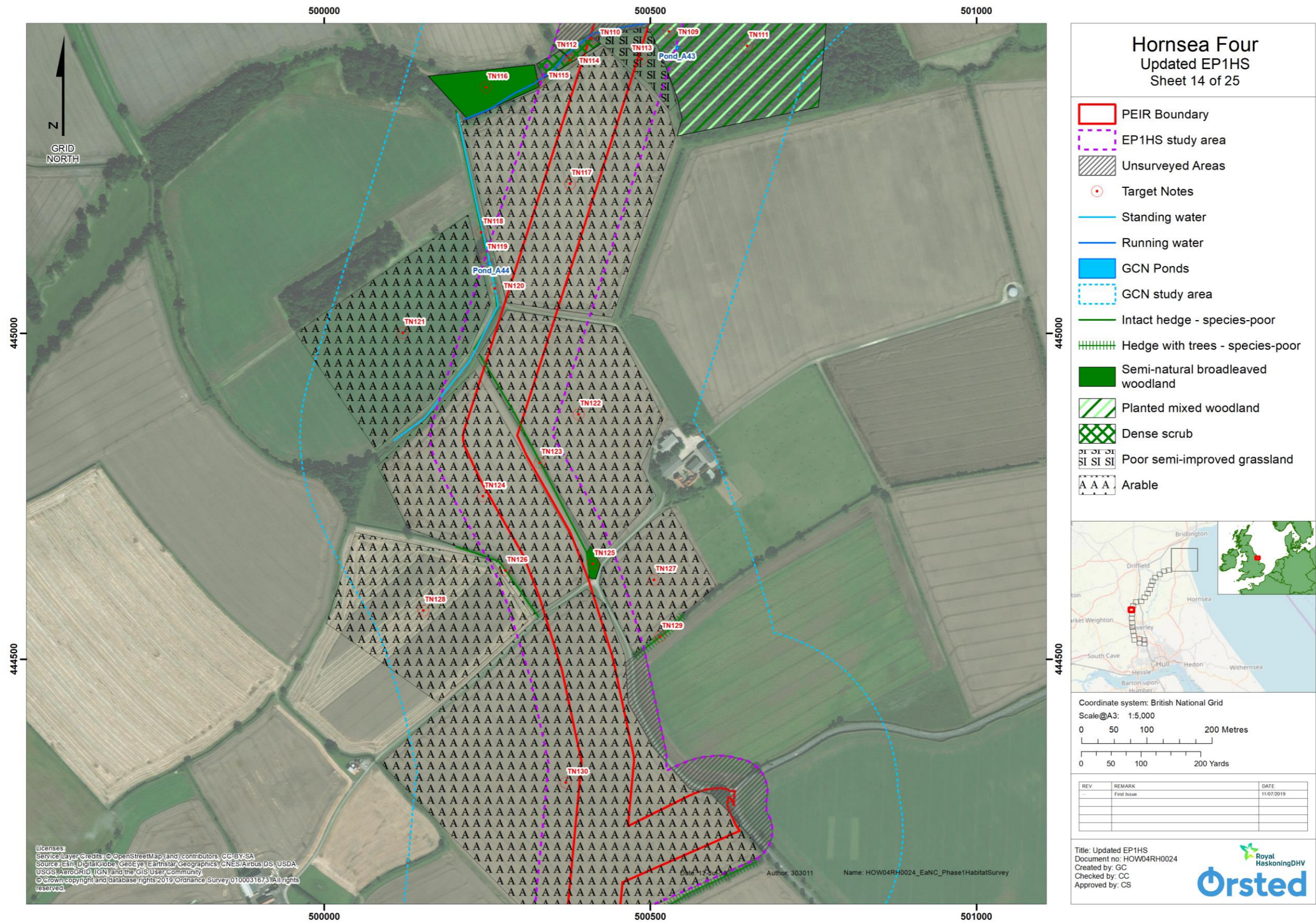


Figure 3.30: Updated Extended Phase 1 Habitat Survey Mapping Sheet 14 (Not to Scale).



Figure 3.31: Updated Extended Phase 1 Habitat Survey Mapping Sheet 15 (Not to Scale).

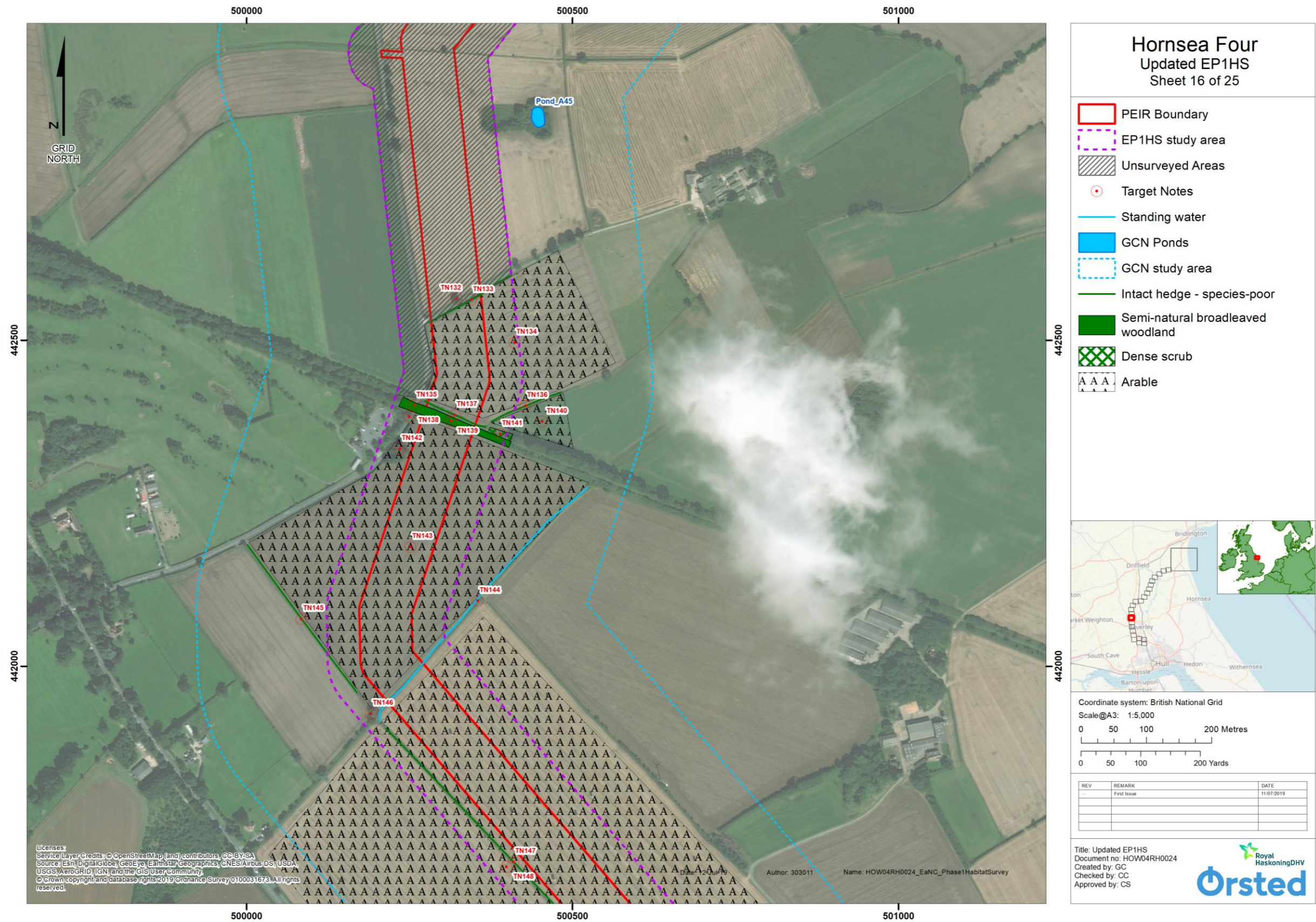


Figure 3.32: Updated Extended Phase 1 Habitat Survey Mapping Sheet 16 (Not to Scale).

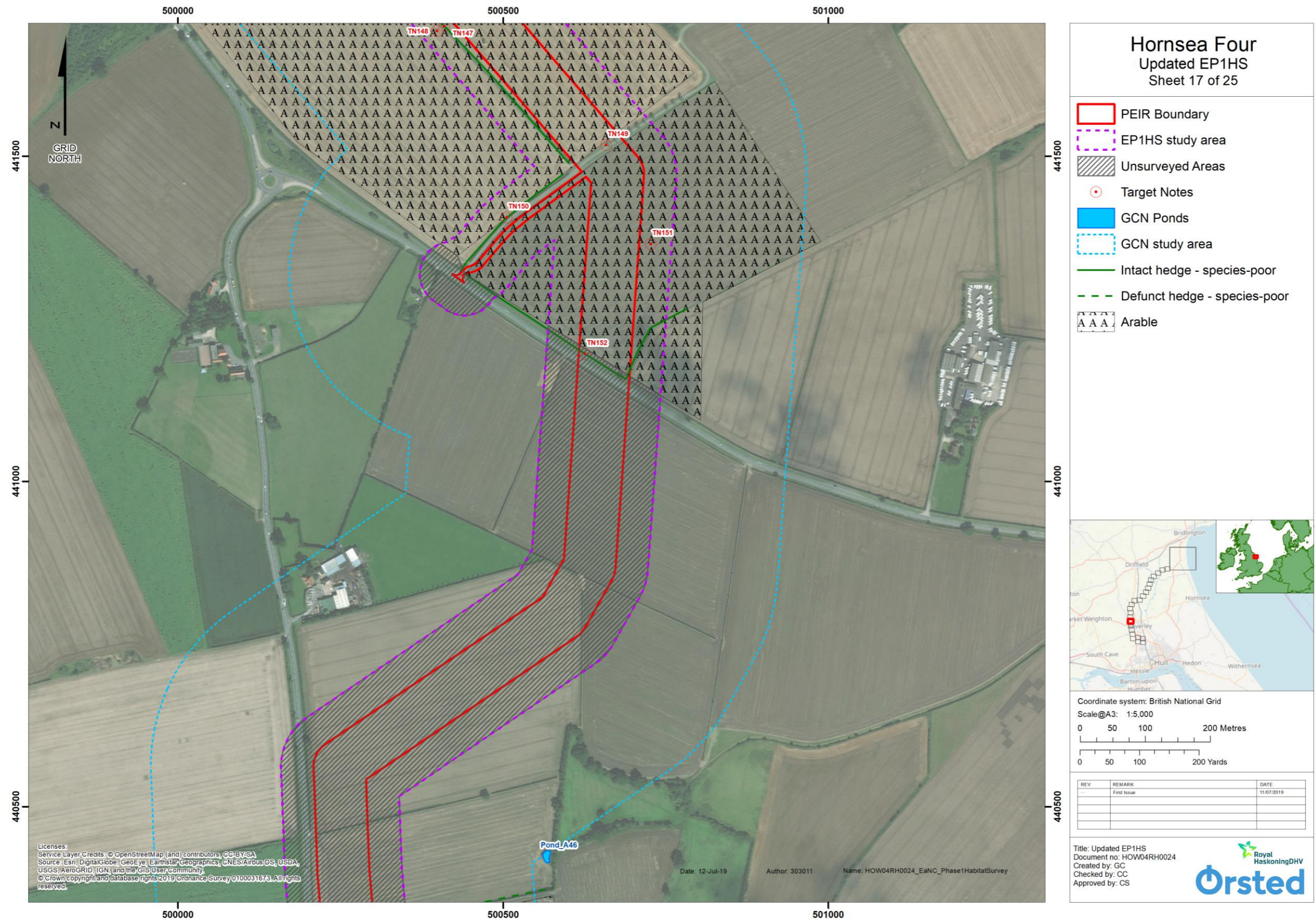


Figure 3.33: Updated Extended Phase 1 Habitat Survey Mapping Sheet 17 (Not to Scale).

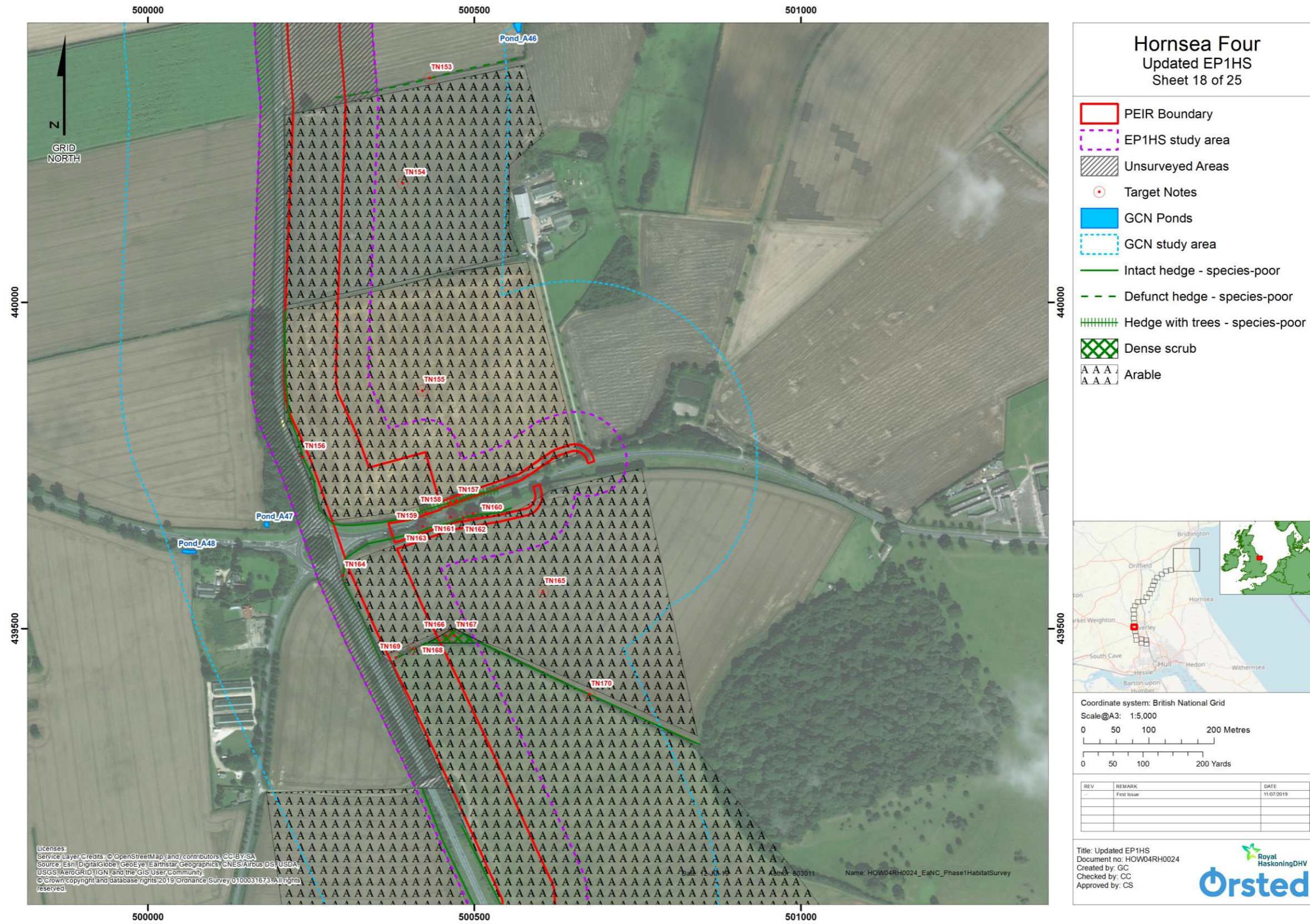


Figure 3.34: Updated Extended Phase 1 Habitat Survey Mapping Sheet 18 (Not to Scale).



Figure 3.35: Updated Extended Phase 1 Habitat Survey Mapping Sheet 19 (Not to Scale).

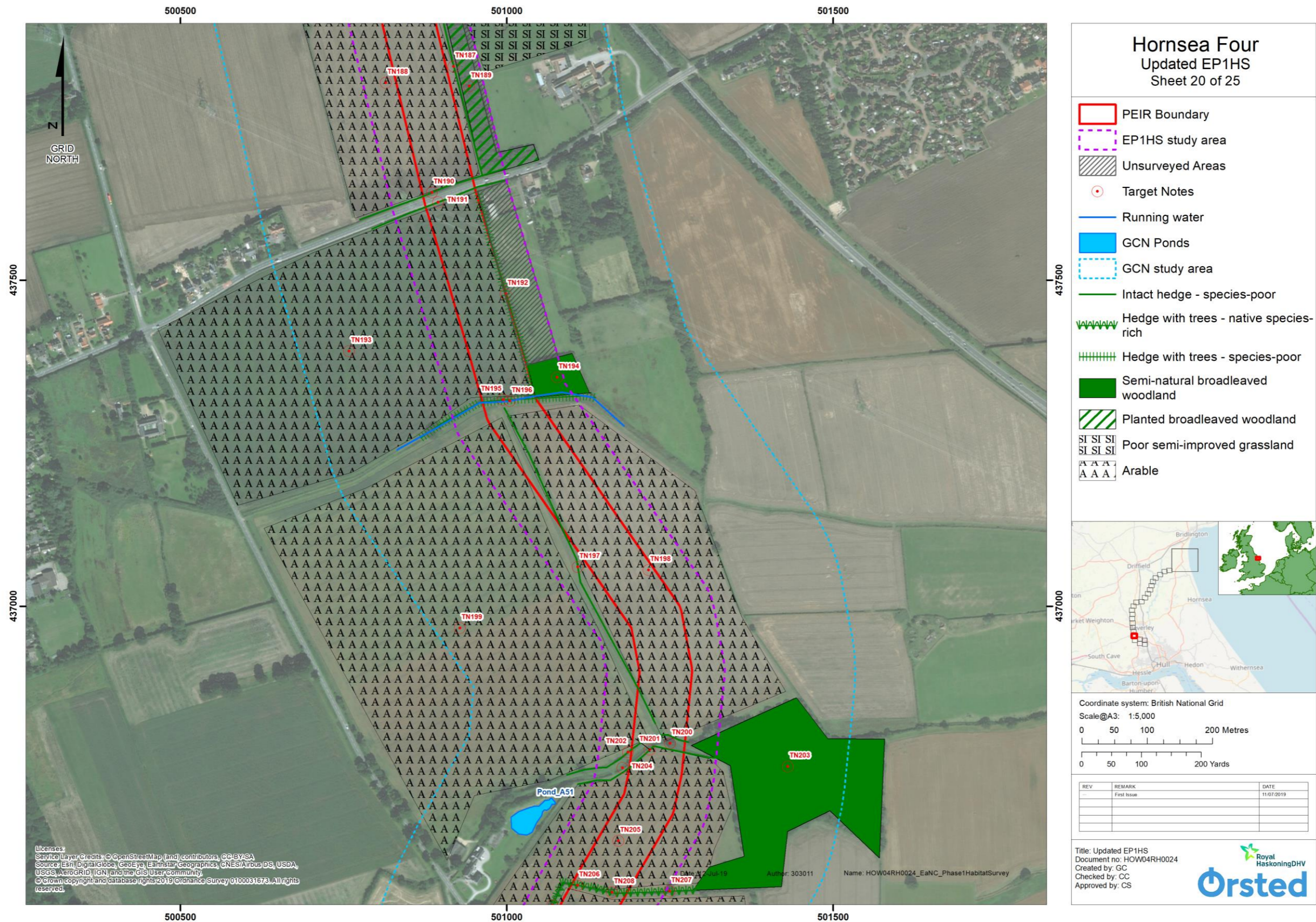


Figure 3.36: Updated Extended Phase 1 Habitat Survey Mapping Sheet 20 (Not to Scale).

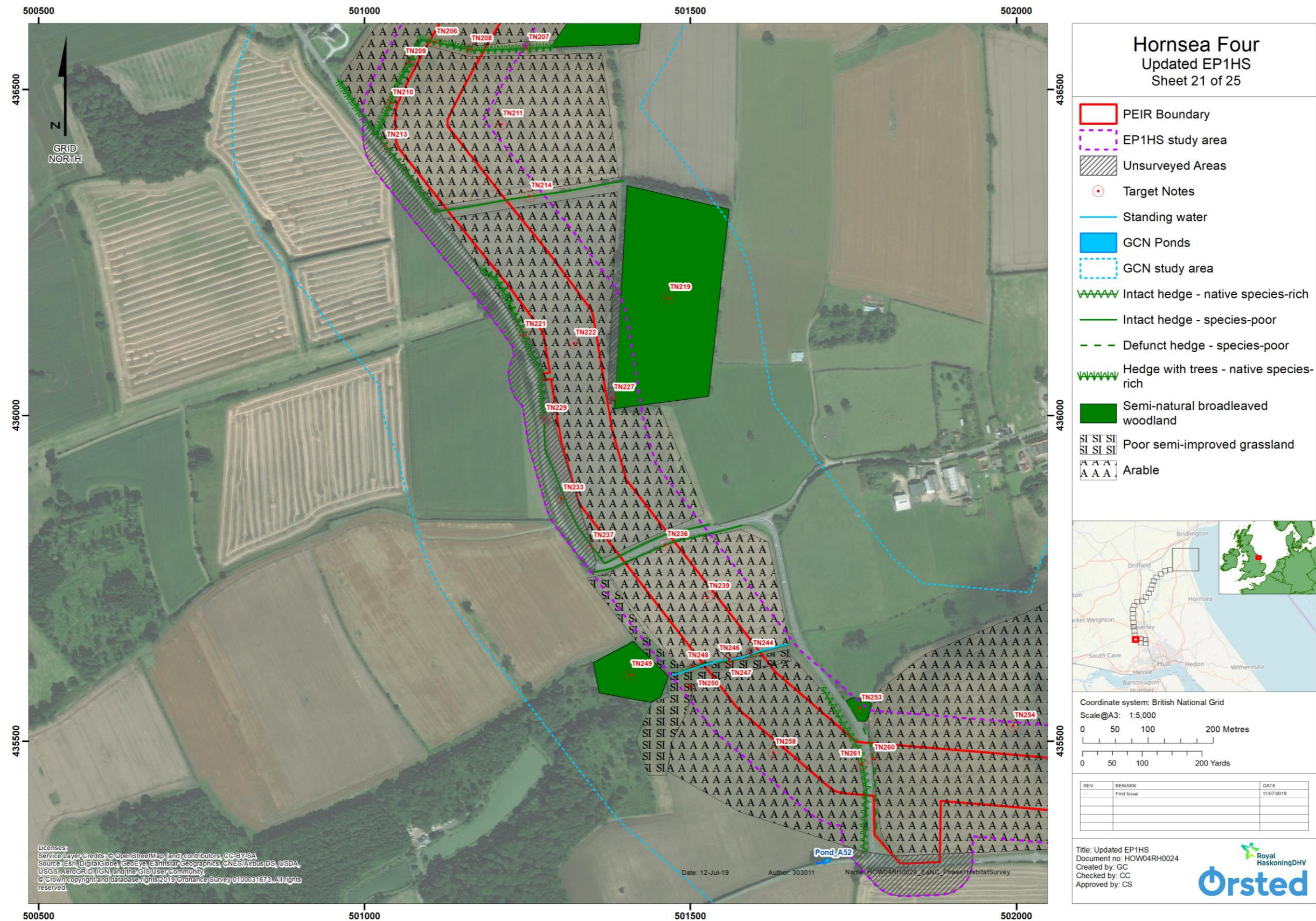


Figure 3.37: Updated Extended Phase 1 Habitat Survey Mapping Sheet 21 (Not to Scale).



Figure 3.38: Updated Extended Phase 1 Habitat Survey Mapping Sheet 22 (Not to Scale).



Figure 3.39: Updated Extended Phase 1 Habitat Survey Mapping Sheet 23 (Not to Scale).

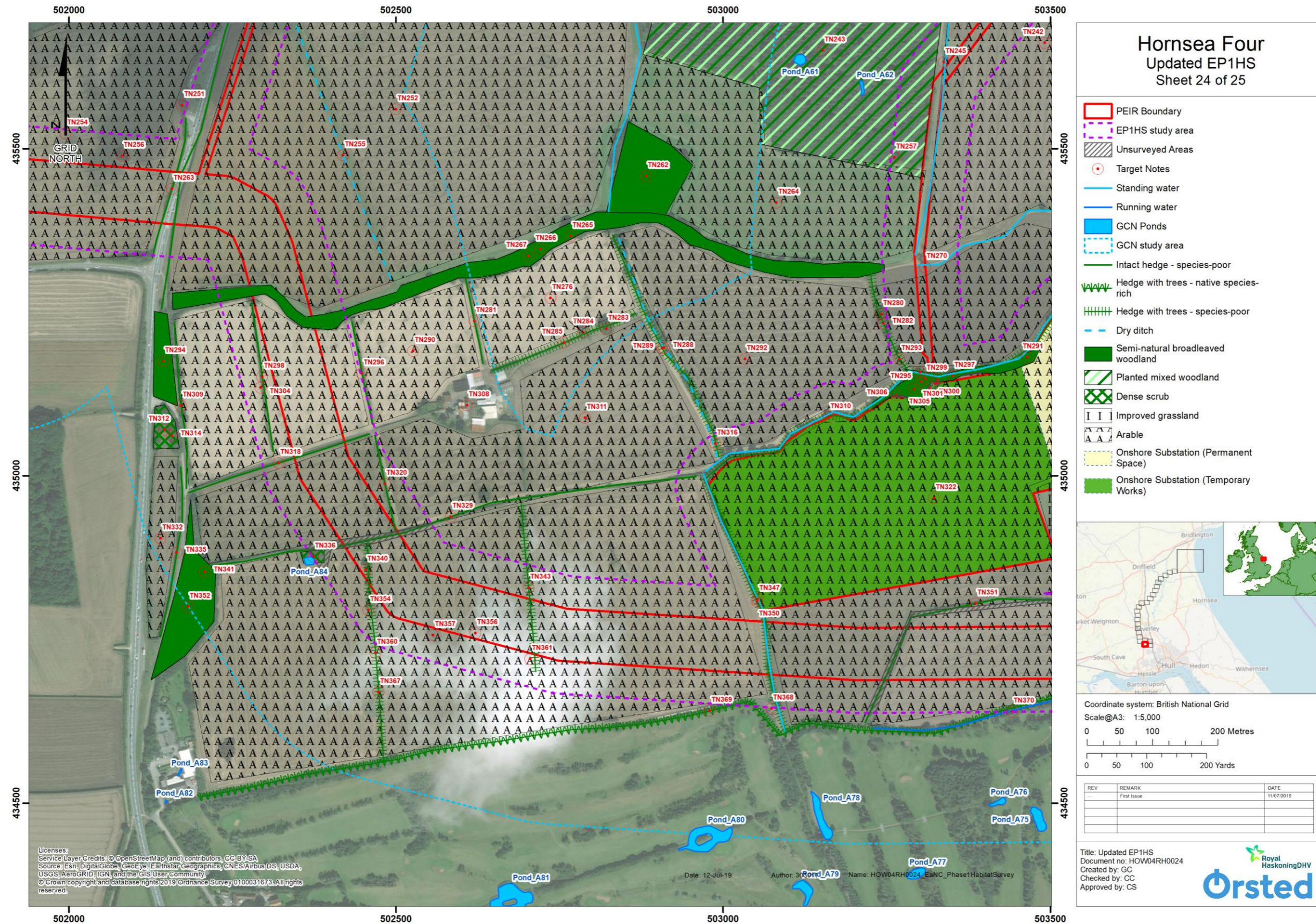


Figure 3.40: Updated Extended Phase 1 Habitat Survey Mapping Sheet 24 (Not to Scale).



Figure 3.41: Updated Extended Phase 1 Habitat Survey Mapping Sheet 25 (Not to Scale).

3.8 Project basis for assessment

3.8.1. Impact register and impacts “scoped out”

3.8.1.1 Based on the baseline environment, the project description outlined in [Volume 1, Chapter 4: Project Description](#) and the Commitments in [Volume 4, Annex 5.2](#), a number of impacts are proposed to be “scoped out” of the PEIR assessment for Ecology and Nature Conservation. These impacts are outlined, together with a justification for scoping them out, in [Table 3.11](#). Further detail is provided in the Impacts Register in [Volume 4, Annex 5.1](#).

3.8.1.2 Please note that the term “scoped out” relates to the Likely Significant Effect (LSE) in EIA terms and not “scoped out” of the EIA process per se. All impacts “scoped out” of LSE are assessed for magnitude, sensitivity of the receiving receptor and conclude an EIA significance in the Impacts Register (see [Volume 4, Annex 5.1](#)). This approach is aligned with the Hornsea Four Proportionate approach to EIA (see [Volume 1, Chapter 5: EIA Methodology](#)).

Table 3.11: Ecology and Nature Conservation Impact Register.

Project activity and impact	Likely significance of effect	Approach to assessment	Justification
<p>Impacts on white-clawed crayfish and fish: Construction (ENC-C-7)</p> <p>Open cut trenching, used to cross watercourses could lead to loss of habitat, disturbance and / or connectivity severance on white-clawed crayfish and fish.</p>	No likely significant effect	Scoped Out	<p>PINS agreed that effects on white clawed crayfish can be scoped out of the EIA.</p> <p>Stakeholders agreed to scope out at Ecology Technical Panel Evidence Plan Meeting #3 held on 8th April 2019</p> <p>There is no evidence of white-clawed crayfish within the data search study area.</p> <p>All EA classified main rivers and IDB maintained drains will be crossed by HDD (Co1), mitigating any impacts on fish species that may be present. In addition, within smaller watercourses that are subject to open cut crossing methods, the following mitigations are proposed:</p> <ul style="list-style-type: none"> - In channel activities that prevent upstream migration will be limited to the duration of open-cut trenching works; and - Any temporary culverts required will be constructed to ensure there is no barrier to upstream fish passage (Co124, Volume F2, Chapter 2: Outline Code of Construction Practice).

Project activity and impact	Likely significance of effect	Approach to assessment	Justification
			<p>To mitigate and avoid any adverse impacts to fish species, the following measures will be adhered to (further information is provided within Volume 1, Chapter 2: Hydrology and Flood Risk):</p> <ul style="list-style-type: none"> • In-channel activities that prevent upstream migration (e.g. river and sea lamprey) will be limited to the duration of open-cut trenching works in any particular location; and - Any temporary culverts will be constructed to ensure they do not create a barrier to upstream fish passage. This will be undertaken following the best guidance practice set out in CIRIA C689 (CIRIA, 2010) Culvert design and operation guide, culverts will be adequately sized to avoid impounding flows. Furthermore, the culvert bed will be installed below the active bed of the watercourse to ensure that sediment continuity and the movement of aquatic organisms can be maintained, and the likelihood of upstream sedimentation and downstream scour is minimised (Co124, Volume F2, Chapter 2: Outline Code of Construction Practice). <p>Further information can be found within, Chapter 2: Hydrology and Flood Risk</p>
<p>Impacts on habitats or species: Construction (ENC-C-10)</p> <p>Construction could cause damage to habitats or species from accidental release of pollutants</p>	<p>No likely significant effect</p>	<p>Scoped Out</p>	<p>PINS agreed that impacts from airbourne contaminants can be scoped out of the EIA.</p> <p>All construction activities will be undertaken in adherence to the project CoCP (Co124), EMP (Co168) and SWMP (Co65) to ensure no adverse effect on habitats or species from the accidental release of pollutants.</p> <p>Further information on baseline environment is presented in Section 3.7 and the mitigations that Hornsea Four have committed to is presented in Table 3.12.</p>

Project activity and impact	Likely significance of effect	Approach to assessment	Justification
<p>Impacts on habitats: Operation (ENC-O-12)</p> <p>Excavating a section of cable for maintenance or repair could cause temporary habitat loss or degradation</p>	<p>No likely significant effect</p>	<p>Scoped Out</p>	<p>PINS agreed that effects on white clawed crayfish can be scoped out of the EIA.</p>
<p>Impacts on protected species: Operation (ENC-O-13)</p> <p>Operation and maintenance activities of the onshore cable route could cause disturbance to protected species</p>	<p>No likely significant effect</p>	<p>Scoped Out</p>	<p>PINS agreed that effects on white clawed crayfish can be scoped out of the EIA.</p>
<p>Impacts on habitats or species: Operation phase (ENC-O-15)</p> <p>Operation and maintenance activities could cause damage to habitats or species from accidental release of pollutants</p>	<p>No likely significant effect</p>	<p>Scoped Out</p>	<p>PINS agreed that this potential effect could be scoped out in their Scoping Opinion (PINS, 2018).</p>
<p>Impacts on habitats: Decommissioning phase for the ECC (ENC-D-16)</p> <p>Decommissioning of onshore cable could cause temporary loss or degradation to habitat</p>	<p>No likely significant effect</p>	<p>Scoped Out</p>	<p>PINS agreed that this potential effect could be scoped out in their Scoping Opinion (PINS, 2018).</p>
<p>Impacts on habitats or species: Decommissioning phase (ENC-O-15)</p>	<p>No likely significant effect</p>	<p>Scoped Out</p>	<p>The construction of Hornsea Four presents the highest potential for significant environmental effects. Impacts during decommissioning would result in an effect of equal significance, at worst. Primary, tertiary and secondary mitigation</p>

Project activity and impact	Likely significance of effect	Approach to assessment	Justification
Decommissioning of the onshore substation could lead to damage to habitats or species from accidental release of pollutants			<p>measures that are necessary to reduce significant effects during construction to acceptable levels would be secured for decommissioning activities, where relevant.</p> <p>All decommissioning activities to be undertaken following same guiding principles and commitments to working methodologies as those undertaken during construction activities, such as adherence to the project CoCP (Co124), EMP (Co168) and SWMP (Co65) to ensure no adverse effect on habitats or species from the accidental release of pollutants.</p>

Notes:

Grey - Potential impact is scoped out and both PINS and Hornsea Four agree.

Red – Potential impact is scoped out with no consensus between PINS and Hornsea Four at EIA Scoping.

3.8.2. Commitments

3.8.2.1 Hornsea Four has adopted several Commitments (primary design principles inherent as part of the project, installation techniques and engineering designs/modifications as part of their pre-application phase, to avoid a number of impacts or reduce impacts as far as possible). Further Commitments (adoption of best practice guidance) are embedded as an inherent aspect of the EIA process. Full details of commitments are included within the [Volume 4, Annex 5.2: Commitments Register](#).

3.8.2.2 The commitments adopted by Hornsea Four in relation to Ecology and Nature Conservation are presented in [Table 3.12](#).

Table 3.12: Commitments relevant to Ecology and Nature Conservation.

Commitment ID	Measure Proposed	How the measure will be secured
Co1	Primary: All main rivers, Internal Drainage Board (IDB) maintained drains, main roads and railways will be crossed by HDD or other trenchless technology as set out in the Onshore Crossing Schedule. Where HDD technologies are not practical, the crossing of ordinary watercourses may be undertaken by open cut methods. In such cases, temporary measures will be employed to maintain flow of water along the watercourse.	DCO Requirement 16 (CoCP)
Co2	Primary: The following sensitive sites will be avoided by the permanent project footprint: Listed Buildings (580 sites), Registered Parks and Gardens (Thwaite Hall and Risby Hall), Scheduled Monuments (30 sites), Conservation Areas (19 sites), non-designated built heritage assets (368	DCO Works Plan - Onshore

Commitment ID	Measure Proposed	How the measure will be secured
	<p>sites) and Ancient Woodland (10 sites). Please refer to PEIR Volume 6, Annex 6.5.1 Appendix B Designated Assets Gazetteer for detailed lists of designated heritage assets that are avoided by Hornsea Four. With the exception of River Hull Headwaters SSSI and Bryan Mills Field, sensitive sites have been avoided. Please refer to PEIR Volume 6, Annex 1.1: Land Quality PRA for details.</p> <p>Where possible, unprotected areas of woodland, mature, and protected trees (those with Tree Preservation Orders TPOs) shall also be avoided or micro sited around.</p>	DCO Requirement 6 (Detailed design approval onshore)
Co4	Tertiary: A Pollution Prevention Plan (PPP) will be developed in accordance with the outline PPP and will include details of emergency spill procedures. Good practice guidance detailed in the Environment Agency's Pollution Prevention Guidance (PPG) notes (including PPG01, PPG05, PPG08 and PPG21) will be followed where appropriate, or the latest relevant available guidance.	DCO Requirement 16 (Code of construction practice)
Co18	HDD entry and exit points will be located at least 9 m away from surface watercourses and the onshore export cable will be installed at least 1.2 m beneath the bed of any watercourses. The optimal clearance depth beneath watercourses will be agreed with the relevant authorities prior to construction. Where Hornsea Four crosses sites of particular sensitivity (e.g. SSSIs) a hydrogeological risk assessment will be undertaken to inform a site-specific crossing method statement which will also be agreed with the relevant authorities prior to construction.	DCO Requirement 16 (CoCP)
Co26	Primary: Where hedgerows require removal, this will be undertaken prior to topsoil removal and the width of hedge removed will be limited where practical. Removed hedges and trees will be replaced with locally appropriate native species.	DCO Requirement 16 (Code of construction practice); and; DCO Requirement 9 (Ecological Management Plan)
Co27	Primary: Trees identified to be retained as per the Onshore Crossing Schedule will be fenced off and worked around. Where works close to trees that will remain in situ are required, techniques will be used to safeguard the root protection zone	DCO Requirement 16 (Code of construction practice); and;

Commitment ID	Measure Proposed	How the measure will be secured
		DCO Requirement 9 (Ecological Management Plan)
Co33	Tertiary: All vegetation requiring removal will be undertaken outside of the bird breeding season. If this is not possible, the vegetation requiring removal will be subject to a nesting bird check by a suitably qualified ECoW. If nesting birds are present, the vegetation will not be removed until the young have fledged or the nest failed.	DCO Requirement 9 (Ecological Management Plan)
Co35	Primary: Provision will be made for badger access in relevant construction areas, when work is not taking place in order to ensure normal movements as far as reasonably possible. Provision will be made to ensure avoiding the entrapment of any animals within relevant construction areas. Checks will be made prior to be made prior to the start of any works to ensure no animals are trapped and if any have fallen in. Appropriate checks will be made as required by the ECoW.	DCO Requirement 9 (Ecological Management Plan)
Co36	Primary: Core working hours for the construction of the onshore components of Hornsea Four will be as follows: <ul style="list-style-type: none"> • Monday to Friday: 07:00 - 18:00 hours; • Saturday: 07:00 - 13:00 hours; • Up to one hour before and after core working hours for mobilisation ("mobilisation period"), i.e. 06:00 to 19:00 weekdays and 06:00 to 14:00 Saturdays; and • Maintenance period 13:00 to 17:00 Saturdays. <i>Activities carried out during mobilisation and maintenance will not generate significant noise levels (such as piling, or other such noisy activities).</i> In circumstances, outside of core working practices, specific works may have to be undertaken outside the core working hours. ERYC will be informed in writing. "	DCO Requirement 16 (CoCP)
Co69	Secondary: Site lighting will only operate when required and will be directional to avoid unnecessary illumination.	DCO Requirement 16 (CoCP)
Co77	Tertiary: A contaminated land and groundwater scheme will be prepared to identify any contamination and any remedial measures which may be required.	DCO requirement 13 (Contaminated land and groundwater scheme)
Co78	Primary: Ponds will be avoided through micro-siting of the onshore export cable where practical.	DCO requirement 13 (Contaminated land and groundwater scheme)
Co114	Tertiary: Good practice air quality management measures will be applied where it is relevant, as described in Institute of Air Quality Management (IAQM) Guidance on the Assessment of Dust from Demolition and Construction 2014, version 1.1, or latest relevant available guidance.	DCO Requirement 16 (CoCP)

Commitment ID	Measure Proposed	How the measure will be secured
Co119	Secondary: In areas of confirmed presence, or potential for great crested newt (i.e. within 250 m of an identified great crested newt pond) appropriate exclusion fencing will be erected and working areas 'trapped out' prior to the commencement of relevant onshore construction works, in line with Great crested newt mitigation guidelines, English Nature, 2001 or the latest available relevant guidance.	DCO Requirement 9 (Ecological Management Plan)
Co120	Secondary: Habitat manipulation will be undertaken in order to discourage reptiles from the working area(s). A qualified ecologist will undertake a search of all working areas identified as being suitable for reptiles. Any reptiles found within the working area will be relocated into suitable adjacent habitat.	DCO Requirement 9 (Ecological Management Plan)
Co122	Secondary: Prior to the commencement of construction activities and due to the mobility of species, pre-construction surveys will be undertaken by the ECoW to ensure the site conditions remain unchanged to that previously recorded. Should site conditions have changed and/or species moved into the working area(s), the ECoW will undertake additional surveys in accordance with the species-specific guidance.	DCO Requirement 9 (Ecological Management Plan)
Co123	Tertiary: Based on noise modelling results, where noise has the potential to cause significant adverse effects, mufflers and acoustic barriers will be used where HDD is being undertaken.	DCO Requirement 16 (CoCP)
Co124	Tertiary: A Code of Construction Practice (CoCP) will be developed in accordance with the outline CoCP. The outline CoCP will include measures to reduce temporary disturbance to residential properties, recreational users, and existing land users.	DCO Requirement 16 (CoCP)
Co127	Tertiary: An Onshore Decommissioning Plan will be developed prior to decommissioning. The Onshore Decommissioning Plan will include provisions for the removal of all onshore above ground infrastructure and the decommissioning of below ground infrastructure and details relevant to pollution prevention and avoidance of ground disturbance. The Onshore Decommissioning Plan will be in line with the latest relevant available guidance.	DCO Requirement 22 (onshore decommissioning)
Co157	Secondary: Any unavoidable damage to fences, hedges, walls, ditches and drainage outfalls will be repaired as soon as reasonably practice.	DCO Requirement 16 (CoCP)
Co159	Secondary: Operational noise from the onshore substation will be at a noise level no greater than 5dB above the representative background (LA90,T) during the day time and night at the NSRs, as stated within the onshore noise assessment (document reference A3.8).	DCO requirement 20 (Control of noise during operational phase)
Co168	Tertiary: An Ecological Management Plan (EMP) will be developed in accordance with the Outline Ecological Management Plan (OEMP), which will include details of onshore ecology and nature conservation pre-construction, construction, post-construction and any long-term mitigation	DCO Requirement 9 (Ecological Management Plan)

Commitment ID	Measure Proposed	How the measure will be secured
	and management (where applicable). The OEMP includes, but is not limited to: habitats, birds, bats, badgers, otters, water voles, reptiles, great crested newts, terrestrial invertebrates, and other protected or notable species where relevant. The OEMP will be developed in consultation with the relevant responsible authorities.	

3.8.3. Maximum Design Scenario

3.8.3.1 The Maximum Design Scenarios (MDS) that have been identified to be relevant to Ecology and Nature Conservation are outlined in [Table 3.13](#) below and are in line with the Project Design Envelope ([Volume 1, Chapter 4: Project Description](#)). These factors relate to the maximum design parameters, maximum duration of construction and maximum ground disturbance that have been considered as the worst case in terms of potential impacts to ecological receptors.

Table 3.13: Maximum design scenario for impacts on Ecology and Nature Conservation.

Impact and Phase	Embedded Mitigation Measures	Maximum Design Scenario / Rochdale Envelope	Justification
<i>Construction</i>			
<p>Direct impacts on designated sites (ENC-C-1):</p> <p>Temporary construction areas could occupy areas leading to loss and/or degradation of designated sites.</p>	<p>Primary:</p> <p>Co1 Co2 Co7 Co26</p> <p>Secondary:</p> <p>Co18</p> <p>Tertiary:</p> <p>Co114</p>	<p>Onshore Export Cable Corridor:</p> <ul style="list-style-type: none"> Construction duration: 30 months Logistics compounds: Number: 8, Size: 140x140 m, Duration: 36 months ECC: Length: 40 km (approximate), Width: 80 m, Area: 3,200,000 m² Haul Road: Number: 1, Width: 6 m (with 7 m passing places), Length: 40 km, Depth: 1 m Temporary access roads: Number: 24, Width: 6 m (with 7 m passing places), Total combined length (excluding existing paved sections): 10 km, Depth: average of 0.5 m Joint Bays: Number: 240, Depth 2.5 m, Area: 225 m² per Joint Bay, Joint Bay compounds: 240 40x40 m compounds Link Boxes: Number: 240, Depth: 2 m, Area: 9 m² per Link Box HDDs: Number: 112, HDD compounds (entry and exit): 56 70x70 m compounds 	<p>These parameters represent maximum ground disturbance conditions both in terms of potential size of area affected and in terms of duration of expected disturbance.</p>
<p>Impacts on non-designated sites (ENC-C-2):</p> <p>Construction compounds, access roads and other infrastructure will temporarily occupy areas leading to loss</p>	<p>Primary:</p> <p>Co1 Co2 Co7 Co26</p> <p>Secondary:</p> <p>Co18</p> <p>Tertiary:</p> <p>Co114</p>	<p>Landfall:</p> <ul style="list-style-type: none"> Construction duration: 32 months Landfall compound: Number: 1, Total Area: 40,000 m², Duration: 32 months Transition Joint Bays (located within Landfall compound area): Number: 6, Depth: 6 m <p>Onshore Export Cable Corridor:</p> <ul style="list-style-type: none"> Construction duration: 30 months Logistics compounds: Number: 8, Size: 140x140 m, Duration: 36 months 	<p>These parameters represent maximum ground disturbance conditions both in terms of potential size of area affected and in terms of duration of expected disturbance.</p>

Impact and Phase	Embedded Mitigation Measures	Maximum Design Scenario / Rochdale Envelope	Justification
and/or degradation of non-designated habitat	Co124 Co168	<ul style="list-style-type: none"> • ECC: Length: 40 km (approximate), Width: 80m, Area: 3,200,000 m² • Cable circuits (HVAC system): Number: 6 • Cable trench: Depth: 1.5 m, Width at base: 1.5 m, Width at surface: 5 m • Haul Road: Number: 1, Width: 6 m (with 7 m passing places), Length: 40 km, Depth: 1 m • Temporary access roads: Number: 24, Width: 6 m (with 7 m passing places), Total combined length (excluding existing paved sections): 10km. • Joint Bays: Number: 240, Depth 2.5 m, Area: 225 m² per Joint Bay, Joint Bay compounds: 240 40x40 m compounds • Link Boxes: Number: 240, Depth: 2 m, Area: 9 m² per Link Box • HDDs: Number: 112, HDD compounds (entry and exit): 56 70x70 m compounds; HDD Compound Duration: 1 month (per compound) <p>Onshore Substation and Energy Balancing Infrastructure:</p> <ul style="list-style-type: none"> • Construction duration: 36 months • Temporary access road: Number: 1, Length: 1,600 m, Width: 15 m (8 m road, 7 m soil storage) • Permanent infrastructure area: 155,000 m² • Temporary works area: 130,000 m² <p>400 kV ECC:</p> <ul style="list-style-type: none"> • Cable circuits: Number: 4 • Cable trench depth: 1.5 m • Length: 2,100 m, Width: 60 m 	
Impacts on bat species (ENC-C-3):	Primary: Co2 Co26 Co36	<p>Landfall:</p> <ul style="list-style-type: none"> • Construction duration: 32 months • Landfall compound: Number: 1, Total Area: 40,000 m², Duration: 32 months 	These parameters represent the maximum numbers of crossing, construction duration

Impact and Phase	Embedded Mitigation Measures	Maximum Design Scenario / Rochdale Envelope	Justification
<p>Construction activities will temporarily occupy areas leading to loss and / or degradation of habitat and loss of habitat connectivity used by bats for roosting, commuting and / or foraging.</p>	<p>Secondary: Co69</p> <p>Tertiary: Co114 Co123 Co124 Co168</p>	<ul style="list-style-type: none"> Transition Joint Bays (located within Landfall compound area): Number: 6, Depth: 6 m <p>Onshore Export Cable Corridor:</p> <ul style="list-style-type: none"> Construction duration: 30 months Logistics compounds: Number: 8, Size: 140x140 m, Duration: 36 months ECC: Length: 40 km (approximate), Width: 80 m, Area: 3,200,000 m² Cable circuits (HVAC system): Number: 6 Temporary access roads: Number: 24, Width: 6 m (with 7 m passing places), Total combined length (excluding existing paved sections): 10km. Joint Bays: Number: 240, Depth 2.5 m, Area: 225 m² per Joint Bay, Joint Bay compounds: 240 40x40 m compounds Link Boxes: Number: 240, Depth: 2 m, Area: 9 m² per Link Box HDDs: Number: 112, HDD compounds (entry and exit): 56 70x70 m compounds; HDD Compound Duration: 1 month (per compound) Crossings affecting potential bat commuting/ foraging or roosting habitats: Number: 324 <p>Onshore Substation and Energy Balancing Infrastructure:</p> <ul style="list-style-type: none"> Construction duration: 36 months Temporary access road: Number: 1, Length: 1,600 m, Width: 15 m (8 m road, 7 m soil storage) Permanent infrastructure area: 155,000 m² Temporary works area: 130,000 m² <p>400 kV ECC:</p> <ul style="list-style-type: none"> Length: 2,100 m, Width: 60 m 	<p>and building design parameters that could potentially disrupt bat commuting/foraging habitat and/or bat roosts.</p> <p>For further detail, see Volume 4, Annex 4.2: Onshore Crossing Schedule.</p>

Impact and Phase	Embedded Mitigation Measures	Maximum Design Scenario / Rochdale Envelope	Justification
<p>Impacts on breeding and / or wintering bird Species (ENC-C-4):</p> <p>Construction activities will temporarily occupy areas leading to loss and / or degradation of habitat and loss of habitat connectivity used by breeding and / or wintering birds.</p>	<p>Primary:</p> <ul style="list-style-type: none"> Co2 Co7 Co26 <p>Tertiary:</p> <ul style="list-style-type: none"> Co33 Co114 Co124 Co168 	<p>Landfall:</p> <ul style="list-style-type: none"> • Construction duration: 32 months • Landfall compound: Number: 1, Total Area: 40,000 m², Duration: 32 months • Transition Joint Bays (located within Landfall compound area): Number: 6, Depth: 6 m <p>Onshore Export Cable Corridor:</p> <ul style="list-style-type: none"> • Construction duration: 30 months • Logistics compounds: Number: 8, Size: 140x140 m, Duration: 36 months • ECC: Length: 40 km (approximate), Width: 80 m, Area: 3,200,000 m² • Cable circuits (HVAC system): Number: 6 • Temporary access roads: Number: 24, Width: 6 m (with 7 m passing places), Total combined length (excluding existing paved sections): 10 km. • Joint Bays: Number: 240, Depth 2.5 m, Area: 225 m² per Joint Bay, Joint Bay compounds: 240 40x40 m compounds • Link Boxes: Number: 240, Depth: 2 m, Area: 9 m² per Link Box • HDDs: Number: 112, HDD compounds (entry and exit): 56 70x70 m compounds; HDD Compound Duration: 1 month (per compound) • Crossings: Number: 324 <p>Onshore Substation and Energy Balancing Infrastructure:</p> <ul style="list-style-type: none"> • Construction duration: 36 months • Temporary access road: Number: 1, Length: 1,600 m, Width: 15 m (8m road, 7m soil storage) • Permanent infrastructure area: 155,000 m² • Temporary works area: 130,000 m² 	<p>These parameters represent maximum ground disturbance conditions both in terms of potential size of area affected and in terms of duration of expected disturbance, alongside</p>

Impact and Phase	Embedded Mitigation Measures	Maximum Design Scenario / Rochdale Envelope	Justification
		400 kV ECC: <ul style="list-style-type: none"> Length: 2,100 m, Width: 60 m 	
<p>Impacts on otter and / or water vole (ENC-C-5):</p> <p>Open cut trenching and HDD used to cross watercourses with otter and / or water vole potential could lead to loss of habitat, disturbance and / or connectivity severance.</p>	<p>Primary:</p> <p>Co1 Co34</p> <p>Secondary:</p> <p>Co18 Co175</p> <p>Tertiary:</p> <p>Co114 Co123 Co124 Co168</p>	<p>Landfall:</p> <ul style="list-style-type: none"> Construction duration: 32 months Trench width per circuit: 1.5 m Potential disturbance corridor from plant movements, excavation, etc.: 60 m per circuit <p>Onshore Export Cable Corridor:</p> <ul style="list-style-type: none"> Construction duration: 30 months ECC: Length: 40 km (approximate), Width: 80 m, Area: 3,200,000 m² Cable circuits (HVAC system): Number: 6 Cable trench: Depth: 1.5 m, Width at base: 1.5 m, Width at surface: 5 m Temporary access bridges: Number: 24, Width: 6 m Crossings: Number: 324 <p>Onshore Substation and Energy Balancing Infrastructure:</p> <ul style="list-style-type: none"> Construction duration: 36 months Temporary access road: Number: 1, Length: 1,600 m, Width: 15 m (8m road, 7m soil storage) Permanent infrastructure area: 155,000 m² Temporary works area: 130,000 m² <p>400 kV ECC:</p> <ul style="list-style-type: none"> Length: 2,100 m, Width: 60 m 	<p>These parameters represent the maximum numbers of crossings that could potentially affect water vole and/or otter habitat.</p>
<p>Impacts on great crested newt populations (ENC-C-6):</p>	<p>Primary:</p> <p>Co2 Co7</p>	<p>Landfall:</p> <ul style="list-style-type: none"> Construction duration: 32 months Landfall compound: Number: 1, Total Area: 40,000 m², Duration: 32 	<p>These parameters represent maximum ground disturbance</p>

Impact and Phase	Embedded Mitigation Measures	Maximum Design Scenario / Rochdale Envelope	Justification
<p>Works in or within 250 m of water bodies with great crested newt potential could cause habitat loss, degradation, habitat severance and harm or kill individual animals.</p>	<p>Co26 Co78</p> <p>Tertiary: Co114 Co124 Co168</p>	<p>months</p> <ul style="list-style-type: none"> Transition Joint Bays (located within Landfall compound area): Number: 6, Depth: 6 m <p>Onshore Export Cable Corridor:</p> <ul style="list-style-type: none"> Construction duration: 30 months Logistics compounds: Number: 8, Size: 140x140 m, Duration: 36 months ECC: Length: 40 km (approximate), Width: 80 m, Area: 3,200,000 m² Cable circuits (HVAC system): Number: 6 Temporary access roads: Number: 24, Width: 6 m (with 7 m passing places), Total combined length (excluding existing paved sections): 10km. Joint Bays: Number: 240, Depth 2.5 m, Area: 225 m² per Joint Bay, Joint Bay compounds: 240 40x40 m compounds Link Boxes: Number: 240, Depth: 2m, Area: 9 m² per Link Box HDDs: Number: 112, HDD compounds (entry and exit): 56 70x70 m compounds; HDD Compound Duration: 1 month (per compound) <p>Onshore Substation and Energy Balancing Infrastructure:</p> <ul style="list-style-type: none"> Construction duration: 36 months Temporary access road: Number: 1, Length: 1,600 m, Width: 15 m (8 m road, 7 m soil storage) Permanent infrastructure area: 155,000 m² Temporary works area: 130,000 m² <p>400 kV ECC:</p> <ul style="list-style-type: none"> Length: 2,100 m, Width: 60 m 	<p>conditions both in terms of potential size of area affected and in terms of duration of expected disturbance.</p>
<p>Impacts on reptiles (ENC-C-8):</p>	<p>Primary: Co2</p>	<p>Landfall:</p> <ul style="list-style-type: none"> Construction duration: 32 months 	<p>These parameters represent maximum</p>

Impact and Phase	Embedded Mitigation Measures	Maximum Design Scenario / Rochdale Envelope	Justification
<p>Construction activities will temporarily occupy areas leading to loss and / or degradation of habitat, loss of habitat connectivity and harm or mortality of individual reptiles.</p>	<p>Co7 Co26 Tertiary: Co114 Co124 Co168</p>	<ul style="list-style-type: none"> • Landfall compound: Number: 1, Total Area: 40,000 m², Duration: 32 months • Transition Joint Bays (located within Landfall compound area): Number: 6, Depth: 6 m <p>Onshore Export Cable Corridor:</p> <ul style="list-style-type: none"> • Construction duration: 30 months • Logistics compounds: Number: 8, Size: 140x140 m, Duration: 36 months • ECC: Length: 40 km (approximate), Width: 80 m, Area: 3,200,000 m² • Cable circuits (HVAC system): Number: 6 • Temporary access roads: Number: 24, Width: 6 m (with 7 m passing places), Total combined length (excluding existing paved sections): 10km. • Joint Bays: Number: 240, Depth 2.5 m, Area: 225 m² per Joint Bay, Joint Bay compounds: 240 40x40 m compounds • Link Boxes: Number: 240, Depth: 2 m, Area: 9m² per Link Box • HDDs: Number: 112, HDD compounds (entry and exit): 56 70x70 m compounds; HDD Compound Duration: 1 month (per compound) <p>Onshore Substation and Energy Balancing Infrastructure:</p> <ul style="list-style-type: none"> • Construction duration: 36 months • Temporary access road: Number: 1, Length: 1,600 m, Width: 15 m (8 m road, 7m soil storage) • Permanent infrastructure area: 155,000 m² • Temporary works area: 130,000 m² <p>400 kV ECC:</p> <ul style="list-style-type: none"> • Length: 2,100 m, Width: 60 m 	<p>ground disturbance conditions both in terms of potential size of area affected and in terms of duration of expected disturbance.</p>

Impact and Phase	Embedded Mitigation Measures	Maximum Design Scenario / Rochdale Envelope	Justification
<p>Impacts on badgers (ENC-C-9):</p> <p>Construction activities could disturb badger setts and / or lead to temporary severance of territories.</p>	<p>Primary:</p> <ul style="list-style-type: none"> Co2 Co7 Co26 Co35 Co36 <p>Tertiary:</p> <ul style="list-style-type: none"> Co114 Co123 Co124 Co168 	<p>Landfall:</p> <ul style="list-style-type: none"> • Construction duration: 32 months • Landfall compound: Number: 1, Total Area: 40,000 m², Duration: 32 months • Transition Joint Bays (located within Landfall compound area): Number: 6, Depth: 6m <p>Onshore Export Cable Corridor:</p> <ul style="list-style-type: none"> • Construction duration: 30 months • Logistics compounds: Number: 8, Size: 140x140 m, Duration: 36 months • ECC: Length: 40 km (approximate), Width: 80 m, Area: 3,200,000 m² • Cable circuits (HVAC system): Number: 6 • Temporary access roads: Number: 24, Width: 6 m (with 7 m passing places), Total combined length (excluding existing paved sections): 10km. • Joint Bays: Number: 240, Depth 2.5 m, Area: 225 m² per Joint Bay, Joint Bay compounds: 240 40x40 m compounds • Link Boxes: Number: 240, Depth: 2 m, Area: 9 m² per Link Box • HDDs: Number: 112, HDD compounds (entry and exit): 56 70x70 m compounds; HDD Compound Duration: 1 month (per compound) <p>Onshore Substation and Energy Balancing Infrastructure:</p> <ul style="list-style-type: none"> • Construction duration: 36 months • Temporary access road: Number: 1, Length: 1,600 m, Width: 15 m (8 m road, 7 m soil storage) • Permanent infrastructure area: 155,000 m² • Temporary works area: 130,000 m² <p>400 kV ECC:</p> <ul style="list-style-type: none"> • Length: 2,100 m, Width: 60 m 	<p>These parameters represent maximum ground disturbance conditions both in terms of potential size of area affected and in terms of duration of expected disturbance.</p>

Impact and Phase	Embedded Mitigation Measures	Maximum Design Scenario / Rochdale Envelope	Justification
<i>Operation</i>			
<p>Impacts on habitats or species (ENC-O-11):</p> <p>Operation of the onshore substation will cause long-term habitat loss, degradation and potential displacement of protected species</p>	<p>Tertiary: Co168</p> <p>Secondary: Co159</p>	<p>Onshore Substation and Energy Balancing Infrastructure:</p> <ul style="list-style-type: none"> Permanent infrastructure area: 155,000 m² Noise output (Variable Shunt Reactor): 97 dB per unit Number of variable shunt reactors: 12 	<p>These parameters represent maximum land take and operational activities relevant to the OnSS.</p>
<p>Impacts on protected species (ENC-O-13):</p> <p>Operation and maintenance activities of the onshore substation could cause disturbance to protected species</p>	<p>Tertiary: Co124 Co168</p> <p>Secondary: Co159</p>	<p>Onshore Substation and Energy Balancing Infrastructure:</p> <ul style="list-style-type: none"> Permanent infrastructure area: 155,000 m² Noise output (Variable Shunt Reactor): 97 dB per unit Number of variable shunt reactors: 12 	<p>These parameters represent maximum land take and operational activities relevant to the OnSS.</p>
<i>Decommissioning</i>			
<p>Impacts on habitats (ENC-D-17):</p> <p>Decommissioning of the onshore substation could lead to temporary habitat loss or degradation</p>	<p>Tertiary: Co124 Co127 Co168</p>	<p>The OnSS above ground electrical equipment and infrastructure will be removed, along with building foundations and security fencing. The site will be returned to its previous condition.</p>	<p>The parameters selected set out the worst case spatial and temporal envelope for ground disturbance during decommissioning of the OnSS.</p>
<p>Impacts on protected species (ENC-D-18):</p>	<p>Tertiary: Co124 Co127</p>	<p>The OnSS above ground electrical equipment and infrastructure will be removed, along with building foundations and security fencing. The site will be returned to its previous condition.</p>	<p>The parameters selected set out the worst case spatial and</p>

Impact and Phase	Embedded Mitigation Measures	Maximum Design Scenario / Rochdale Envelope	Justification
Decommissioning of the onshore substation could lead to temporary disturbance or displacement of protected species	Co168		temporal envelope for ground disturbance during decommissioning of the OnSS.
<p>Impacts on habitats or species (ENC-D-19):</p> <p>Decommissioning of the onshore substation could lead to damage to habitats or species from accidental release of pollutants</p>	Tertiary: Co124 Co127 Co168	The OnSS above ground electrical equipment and infrastructure will be removed, along with building foundations and security fencing. The site will be returned to its previous condition.	The parameters selected set out the worst case spatial and temporal envelope for ground disturbance during decommissioning of the OnSS.

3.9 Assessment methodology

3.9.1.1 The assessment methodology for Ecology and Nature Conservation is consistent with that presented in Annex C of the Scoping Report (Orsted, 2018). There have been no deviations or variations to the assessment methodology since the scoping phase.

3.9.2. Ecology Impact Assessment (EclA) overview

3.9.2.1 The EclA methodology proposed in relation to Ecology and Nature Conservation is based on the Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (CIEEM, 2018). These guidelines aim to predict the residual impacts on important ecological features affected, either directly or indirectly by a development, once all the appropriate mitigation has been implemented.

3.9.2.2 The approach to determining the significance of an impact follows a systematic process for all impacts. This involves identifying, qualifying and, where possible, quantifying the sensitivity and value of all ecological receptors and magnitude of effects which have been scoped into this assessment. Using this information, the significance of each potential impact has been determined. Each of these steps is set out in the remainder of this section.

3.9.2.3 The EclA has used professional judgement to ensure the assessed significance level is appropriate for each individual receptor, taking account of local values for biodiversity to avoid a subjective assessment wherever possible as per the CIEEM guidelines. As a result, the assessed significance level may not always be directly attributed to the guidance matrix detailed below.

3.9.3. Importance

3.9.3.1 The first stage of an EclA is determining the 'importance' of ecological features or 'receptors'. CIEEM identifies the important ecological features as those key sites, habitats and species which have been identified by European, national and local governments and specialist organisations as a key focus for biodiversity conservation in the UK. These include:

- Statutory and non-statutory designated sites for nature conservation;
- Species occurring on national biodiversity lists;
- UK HPs; and
- Red listed, rare or legally protected species.

3.9.3.2 Importance is also qualified by the geographic context of an ecological receptor, i.e. a species which may be not recognised on a national biodiversity list may be locally in decline, and therefore its local importance is greater than its national importance.

3.9.3.3 For this EclA, the guidelines outlined in [Table 3.14](#) will be followed to provide the relative importance of different ecological features.

Table 3.14: Definition of terms relating to receptor value and/or importance.

Ranking	Habitats
Very High	<ul style="list-style-type: none"> Habitats or species that form part of the cited interest within an internationally protected site, such as those designated under the Conservation of Habitats and Species Regulations (e.g. SPAs) 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 or SPA)
High	<ul style="list-style-type: none"> Habitats or species that form part of the cited interest within a nationally designated site, such as a SSSI or 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 a SSSI Species that are protected under the Wildlife and Countryside Act 1981 (as amended) or Conservation of Habitats and Species Regulations (2017) Presence of habitats or where the action plan states that all areas of representative habitat or individuals of the species should be protected
Medium	<ul style="list-style-type: none"> 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 Local Nature Reserve (LNR), or some local-level designated sites, such as a Local Wildlife Site (LWS), also referred to as a non-statutory Site of Importance for Nature Conservation or the equivalent (e.g. Ancient Woodland) Presence of habitats or species listed under Natural Environment and Rural Communities (2006) Schedule 41 LBAP habitats or species, where the action plan states that all areas of representative habitat or individuals of the species should be protected
Low	<ul style="list-style-type: none"> A feature of importance at local 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	<ul style="list-style-type: none"> A feature of importance at a 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

3.9.3.4 CIEEM places the emphasis on using professional judgement when considering importance of ecological receptors, based on available guidance, information and expert advice (CIEEM, 2016). Various aspects of ecological importance should be taken into account, including designations, biodiversity value, potential value, secondary or supporting value, social value, economic value, legal protection and multi-functional features.

3.9.4. Magnitude

3.9.4.1 The magnitude of the impact is assessed according to:

- The extent of the area subject to a predicted impact;
- The duration the impact is expected to last prior to recovery or replacement of the resource or feature;
- Whether the impact is reversible, with recovery through natural or spontaneous regeneration, or through the implementation of mitigation measures or irreversible, when no recovery is possible within a reasonable timescale or there is no intention to reverse the impact; and
- The timing and frequency of the impact, i.e. conflicting with critical seasons or increasing impact through repetition.

3.9.4.2 **Table 3.15** summarises the definitions of magnitude that have been used for the onshore ecological receptors.

Table 3.15: Definition of terms relating to magnitude of an impact.

Ranking	Habitat	Environmental factors (e.g. presence, ambient air quality, noise)
Large	Widespread and/or permanent disturbance or loss of a habitat, threatening the long-term viability or function of the habitat	Change over a large area that lasts over the medium to long term, likely to cause secondary effects on ecology and/or routine exceedance of benchmark limits. A long-term physical change that affects a large area or introduces a permanent physical barrier
Medium	Localised disturbance and/or loss of habitat that does not threaten the long-term viability or function of the habitat	Temporary or localised change and/or occasional exceedance of benchmark limits. A physical change in the medium term over a relatively large area
Small	Minimal disturbance and/or loss of habitat, such that there is no loss of viability or function of the habitat	Slight change expected over a limited area and returning to background levels within a few metres or tens of metres. No exceedances of benchmark limits. A temporary and localised physical change/source of disturbance
Negligible	Immeasurable, undetectable or within the range of normal natural variation change to the extent and condition of habitat	Change is within the normal range of natural variation

3.9.5. Duration

3.9.5.1 The definitions of duration used within this EclA are dependent on the individual ecological receptor, and how sensitive it is to effects over different timescales. However, in general terms the following definitions have been used:

- Short term – effects which at most occur over a part of – or over a part of a key period of – a species' active season or a habitat's growing season, i.e. typically affects which occur over a matter of days or weeks;
- Medium term – effects which occur over the full duration of a species' active season or a habitat's growing season, i.e. typically affects which occur over a matter of months or one year; and
- Long term – effects which occur over the multiple active or growing seasons, i.e. typically affects which occur over more than one year.

3.9.6. Impact Significance

3.9.6.1 Following the identification of receptor importance and magnitude of the effect, it is possible to determine the significance of the impact.

3.9.6.2 Ecologically significant impacts are defined as:

'...impacts on structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution)' (CIEEM 2016a).

3.9.6.3 Impacts are unlikely to be significant where features of low importance are subject to small scale or short-term effects. If an impact is not significant at the level at which the resource or feature has been valued, it may be significant at a more local level.

3.9.6.4 CIEEM recommend that the following factors are taken into account when determining significance for selected ecological receptors:

- Designated sites – is the project and associated activities likely to undermine the site's conservation objectives, or positively or negatively affect the conservation status of species or habitats for which the site is designated, or may it have positive or negative effects on the condition of the site or its interest/qualifying features?
- Ecosystems – is the project likely to result in a change in ecosystem structure and function?
- Habitats – conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area.
- Species – conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area (CIEEM 2016a).

- 3.9.6.5 Following the identification of receptor importance and magnitude of effect, the significance of the impact has been considered using the matrix presented in **Table 3.16:** below and knowledge of the ecological features affected.
- 3.9.6.6 The assessment of potential impacts has been undertaken assuming implementation of embedded mitigation and project commitments made as part of the design process. Where, following this assessment, likely significant impacts are identified, additional mitigation measures are then proposed. A final assessment of the residual impacts remaining following implementation of these additional mitigation measures is then made.
- 3.9.6.7 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 3.16: Matrix used for the assessment of the significance of the effect.

		Magnitude of Impact/Degree of Change			
		Negligible	Minor	Moderate	Major
Value, Importance, Sensitivity	Low	Not Significant	Not Significant or Minor (Not Significant)	Minor (Not Significant)	Minor (Not Significant) or Moderate (Significant)
	Medium	Not Significant	Minor (Not Significant)	Moderate (Significant)	Moderate (Significant) or Major (Significant)
	High	Not Significant	Minor (Not Significant) or Moderate (Significant)	Moderate (Significant) or Major (Significant)	Major (Significant) or Substantial (Significant)
	Very High	Not Significant	Moderate (Significant) or Major (Significant)	Major (Significant) or Substantial (Significant)	Substantial (Significant)

- 3.9.6.8 Following initial assessment, if the impact does not require additional mitigation (or none is possible) the residual impact will remain the same. If, however, additional mitigation is proposed there will be an assessment of the post-mitigation residual impact.
- 3.9.6.9 The Draft Report to Inform Appropriate Assessment (RIAA) is currently being prepared in accordance with Advice Note Ten: Habitats Regulations Assessment Relevant to Nationally Significant Infrastructure Projects (PINS, 2016) and will be submitted separately to the Ecology and Nature Conservation PEIR chapter, in August 2019.

3.10 Impact assessment

3.10.1. Construction

3.10.1.1 The impacts of the onshore construction of Hornsea Four have been assessed on Ecology and Nature Conservation. The environmental impacts arising from the construction of Hornsea Four are listed in **Table 3.13**: along with the maximum design scenario against which each construction phase impact has been assessed.

3.10.1.2 As presented in **Section 3.1** no impact assessment has been undertaken on those features/species for which baseline data collection is currently ongoing. This approach was agreed with stakeholders at the Ecology Evidence Plan Meeting on 8th April 2019.

3.10.1.3 A description of the potential effect on Ecology and Nature Conservation receptors caused by each identified impact is given below.

Direct impacts on designated sites during construction: temporary construction activities could occupy areas leading to loss and/or degradation of designated sites (ENC-C-1).

Magnitude of impact

3.10.1.4 As discussed in **Section 3.7** there is one statutory designated site within the onshore PEIR boundary, the River Hull Headwaters SSSI, and six non-statutory designated sites (LWSs) that the onshore ECC directly interacts with. In addition, taking into account the IRZs, a further statutory designated site, Bryan Mills Field SSSI, has the potential to be impacted by construction activities associated with Hornsea Four.

3.10.1.5 According to the parameters in **Table 3.14**: , The River Hull Headwaters and Bryan Mills Field, as SSSIs are considered to be of **high** value, whilst the six LWSs are considered to be of **medium** value.

3.10.1.6 Installation of the onshore cables, temporary works and lay down areas within proximity to these designated sites has the potential to affect their integrity. Key considerations for determining the magnitude of the impact include the following parameters:

- The extent of habitat disturbance;
- The duration of habitat disturbance; and
- The timing of construction works.

3.10.1.7 Whilst the total maximum construction period for cable installation over the entire onshore ECC will be 30 months, the precise duration of impacts at any one location will be dependent on the specific construction sequence to be followed at that location and the prevailing ground conditions. The maximum working width of the onshore ECC will be 80 m (with a 60 m permanent footprint).

3.10.1.8 The following impacts are considered with regard to designated sites:

- Degradation of key habitats and species for which the sites are cited for (Table 3.8); and
- Direct contamination of watercourses from construction spills.

3.10.1.9 There are a number of commitments that Hornsea Four has embedded within the project design that are applicable, these are shown in Table 3.12: and Table 3.13.

3.10.1.10 The impact on designated sites is considered to be temporary in nature, as the construction will take a maximum of 30 months. Furthermore, the crossing of the River Hull SSSI will be via HDD (or other trenchless methodologies) (Co1), including sensitive placement of the entry/exit HDD pits to be within arable fields that are distant from the sensitive habitats adjacent to the SSSI (Co18). Therefore, the magnitude of the impact that construction activities relating to Hornsea Four will have on designated sites is considered to be **minor**, indicating that the potential is for localised disturbance and/or loss of habitat that does not threaten the long-term viability of the designated site.

Sensitivity of the receptor

3.10.1.11 The sensitivity of the designated sites (statutory and non-statutory) is considered to be **medium**, reflecting that the receptor has some ability to tolerate the potential impacts and could potentially recover to an acceptable status over a 10-year period.

Significance of the effect

3.10.1.12 The commitments that Hornsea Four have proposed (as shown in Table 3.12:) which includes the use of HDD (or other trenchless techniques) to avoid direct impacts to the River Hull SSSI (Co1), alongside sensitive placement of HDD entry/exit pits outside the designated habitats immediately surrounding the SSSI (Co18) alongside adherence to the CoCP (Co124) and EMP (Co168), to minimise the disturbance of designated sites, overall, it is predicted that the sensitivity of the receptor is **medium**, and the magnitude is **minor**. The effect is of **minor adverse** significance, which is not significant in EIA terms.

Impacts on non-designated sites during construction: construction compounds, access roads and other infrastructure will temporarily occupy areas leading to loss and/or degradation of non-designated habitats (ENC-C-2).

Magnitude of impact

3.10.1.13 The predominant habitat type within the Hornsea Four onshore PEIR boundary is arable land, consisting of crops, ploughed fields and winter cover at the time of the updated EP1HS. There is a total of 373 ha of arable land within the Onshore PEIR boundary. Arable land is typically of low ecological value due to the homogeneity of the habitat alongside farming practices and the presence of herbicides and pesticides within crops. As such, arable land is

considered to be of **negligible** importance. Potential impacts on arable land are further considered within [Chapter 6: Land Use and Agriculture](#).

3.10.1.14 The magnitude of this impact is considered to be **negligible**. Irrespective of the sensitivity of the receptor, the significance of the impact is **not significant** as defined in the assessment of significance matrix ([Table 3.16; Volume 1, Chapter 5: EIA Methodology](#)) and is not considered further in this assessment.

3.10.1.15 Other habitats recorded during the updated EP1HS include the following:

- Woodland (3 ha);
- Scrub (5 ha);
- Hedgerows (7 km);
- Improved grassland (5.5 ha); and
- Poor semi-improved grassland (11.5 ha).

3.10.1.16 The non-designated habitats recorded within the Hornsea Four onshore PEIR boundary are characteristic of an agricultural landscape, consisting of arable fields, bordered by typically species-poor intact hedgerows and small, discrete pockets of woodland and scrub.

3.10.1.17 Installation of the onshore cables, temporary works and lay down areas could lead to temporary loss of these habitats for the duration of the construction phase. Key considerations for determining the magnitude of the impact include the following parameters:

- The extent of habitat disturbance;
- The duration of habitat disturbance; and
- The timing of construction works.

3.10.1.18 Whilst the total maximum construction period for cable installation over the entire onshore ECC route be 30 months, the precise duration of impacts at any one location will be dependent on the specific construction sequence to be followed at that location and the prevailing ground conditions. The maximum width of the onshore ECC will be 80 m, with some cable sections not requiring the full maximum width.

3.10.1.19 There are a number of commitments that Hornsea Four has embedded within the project design that are applicable, these are shown in [Table 3.12: .](#)

3.10.1.20 The impact on non-designated sites is considered to be temporary in nature and limited to a 30 month maximum construction period. Therefore, the magnitude of the impact that construction activities relating to Hornsea Four will have on designated sites is considered to be **minor**, indicating that the potential is for minimal disturbance and/or loss of habitat, such that there is no loss of viability or function of the habitat.

Sensitivity of the receptor

3.10.1.21 The sensitivity of non-designated habitats is considered to be **low**, indicating that the receptor could potentially recover within the short term (e.g. 1 year).

Significance of the effect

3.10.1.22 Taking into consideration the commitments above, which include the use of HDD (or other trenchless techniques) (Co1) and adherence to the Outline CoCP (**Volume F2, Chapter 2**) (Co124) and Outline EMP (**Volume F2, Chapter 3**) (Co168), in order to minimise the disturbance of non-designated sites, overall, it is predicted that the sensitivity of the receptor is **negligible**, and the magnitude is **minor**. The effect is **not significant** in EIA terms.

Impacts on bat species during construction: construction activities will temporarily occupy areas leading to loss and/or degradation of habitat and loss of habitat connectivity used by bats for roosting, commuting and/or foraging (ENC-C-3).

3.10.1.23 Bat surveys are being undertaken between May and October 2019 (inclusive), and until completion, no baseline information is available to allow an impact assessment within this Chapter. This information will be included within the Hornsea Four ES.

Impacts on breeding and/or wintering bird species during construction: construction activities will temporarily occupy areas leading to loss and/or degradation of habitat and loss of habitat connectivity used by breeding and/or wintering birds (ENC-C-4).

3.10.1.24 Impacts on over-wintering bird species are included in the following assessment, however as baseline data collection for breeding birds is currently ongoing, no impact assessment has been completed in respect to breeding bird species. This will be included within the Hornsea Four ES.

Magnitude of impact

3.10.1.25 As presented in **Section 3.7** a varied assemblage of over-wintering birds has been recorded within the Hornsea Four PEIR boundary. Of the species recorded, a number of BoCC4 'red list' and 'amber list' birds were recorded and some species that are protected under Schedule 1 of the Wildlife and Countryside Act, 1981. Survey results showed that those species identified were to be expected within the context of the habitats present within the Hornsea Four onshore PEIR boundary, these included a number of farmland passerines, ducks, geese, waders and migratory thrushes.

3.10.1.26 According to the parameters in **Table 3.14:** , over-wintering bird species such as those recorded during the over-wintering bird survey effort are considered to be of **high** importance.

3.10.1.27 Construction works associated with Hornsea Four has the potential to affect habitats that may be utilised by over-wintering bird species, or the potential to disrupt their feeding

options. Key considerations for determining the magnitude of the impact include the following parameters:

- The extent of habitat disturbance;
- The duration of habitat disturbance; and
- The timing of construction works.

3.10.1.28 Whilst the total maximum construction period for cable installation at the landfall will be 36 months, with the total over the entire onshore ECC route being 30 months, the precise duration of impacts at any one location will be dependent on the specific construction sequence to be followed at that location and the prevailing ground conditions. Furthermore, the maximum width of the onshore ECC will be 80m.

3.10.1.29 The following impacts are considered with regard to designated sites:

- Degradation of key habitats used by over-wintering bird species; and
- Disturbance of over-wintering bird species.

3.10.1.30 There are a number of commitments that Hornsea Four has embedded within the project design that are applicable, these are shown in [Table 3.12](#).

3.10.1.31 The impact on over-wintering birds is considered to be temporary in nature and limited to a 30-month maximum construction period. Therefore, the magnitude of the impact that construction activities relating to Hornsea Four will have on over-wintering birds is considered to be **minor**, indicating that the potential is minimal disturbance and/or loss of habitat, such that there is no loss of viability or function of the habitat.

Sensitivity of the receptor

3.10.1.32 The sensitivity of over-wintering birds is considered to be **medium**, reflecting that the receptor has some ability to tolerate the potential impacts and could potentially recover to an acceptable status over a 10-year period.

Significance of the effect

3.10.1.33 Taking into consideration the commitments above, which include the programming of works to be outside of the over-wintering bird season, in order to minimise the disturbance of over-wintering birds, overall, it is predicted that the sensitivity of the receptor is **medium**, and the magnitude is **minor**. The effect is of **minor adverse** significance, which is not significant in EIA terms.

Impacts on otter and/or water vole during construction: open cut trenching and HDD used to cross watercourses with otter and/or water vole potential could lead to loss of habitat, disturbance and/or connectivity severance (ENC-C-5).

3.10.1.34 Water vole and otter surveys are being undertaken in May and September 2019, and until completion, no baseline information is available to allow an impact assessment within this Chapter. This information will be included within the Hornsea Four ES.

Impacts on great crested newt populations during construction: works in or within 250m of waterbodies with great crested newt potential could cause habitat loss, degradation, habitat severance and harm or kill individual animals (ENC-C-6).

3.10.1.35 Partial survey data for great crested newts has been collected, equating to approximately 60% coverage of ponds within, and up to 250 m from the Hornsea Four onshore PEIR boundary. Further surveys have been taken, however full sampling analysis for all ponds surveyed is outstanding and until completion, no baseline information is available to allow an impact assessment within this Chapter. This information will be included within the Hornsea Four ES.

Impacts on reptiles during construction: construction activities will temporarily occupy areas leading to loss and/or degradation of habitat, loss of habitat connectivity and harm or cause mortality to individual animals (ENC-C-8).

Magnitude of impact

3.10.1.36 The predominant habitat type within the Hornsea Four onshore PEIR boundary is arable land, consisting of crops, ploughed fields and winter cover at the time of the updated EP1HS. A number of small, discrete habitat mosaics were recorded as offering hibernation and basking/foraging opportunities for reptile species, including the below. However, these areas were small, discrete locations scattered throughout the Hornsea Four onshore PEIR boundary:

- Woodland (3 ha);
- Scrub (5 ha);
- Hedgerows (7 km);
- Improved grassland (5.5 ha); and
- Poor semi-improved grassland (11.5 ha)

3.10.1.37 As a nationally important species which is protected under the Wildlife and Countryside Act 1981 (as amended), reptiles are considered to of **medium** importance.

3.10.1.38 Installation of the onshore cables, temporary works and lay down areas could lead to temporary loss of these habitats for the duration of the construction phase and could also result in the mortality of reptile species. Key considerations for determining the magnitude of the impact include the following parameters:

- The extent of habitat disturbance;
- The duration of habitat disturbance; and
- The timing of construction works.

3.10.1.39 Whilst the total maximum construction period for cable installation over the entire onshore ECC route will be 30 months, the precise duration of impacts at any one location will be dependent on the specific construction sequence to be followed at that location and the prevailing ground conditions. Furthermore, the maximum width of the onshore ECC will be 80 m, with some cable sections not requiring the full maximum width.

3.10.1.40 There are a number of commitments that Hornsea Four has embedded within the project design that are applicable, these are shown in [Table 3.12](#).

3.10.1.41 The impact on reptile species is considered to be temporary in nature, given construction activity is within three months on each section of onshore ECC, spread over the course of the wider 30 months construction window. Therefore, the magnitude of the impact that construction activities relating to Hornsea Four will have on reptile species is considered to be **moderate**, indicating that the potential is for minimal disturbance and/or loss of habitat, such that there is no loss of viability or function of the habitat.

Sensitivity of the receptor

3.10.1.42 The sensitivity of reptile species is considered to be **low**, indicating that the receptor could potentially recover within the short term (e.g. 1 year).

Significance of the effect

3.10.1.43 Taking into consideration the commitments above, which include the retention of habitat features where possible, the use of reptile fencing where applicable, and the majority of works to be undertaken outside of the reptile hibernation period, in order to minimise the disturbance on reptile species, overall, it is predicted that the sensitivity of the receptor is **low**, and the magnitude is **moderate**. The effect is of **minor adverse** significance, which is not significant in EIA terms.

Impacts on badgers during construction: Construction activities could disturb badger setts and/or lead to temporary severance of badger territories (ENC-C-9).

3.10.1.44 Badger surveys are being undertaken in May 2019 and until completion, no baseline information is available to allow an impact assessment within this Chapter. This information will be included within the Hornsea Four ES.

3.10.2. Operation and Maintenance

3.10.2.1 The impacts of the onshore operation and maintenance of Hornsea Four will be assessed on ecology and nature conservation with the Hornsea Four ES with the DCO application. The environmental impacts arising from the operation and maintenance of Hornsea Four are listed in [Table 3.13](#): along with the maximum design scenario against which each operation and maintenance phase impact has been assessed.

Impacts on habitats or species during operation: operation of the onshore substation will cause long term habitat loss, degradation and potential displacement of protected species (ENC-O-11).

3.10.2.2 Baseline surveys are ongoing at the time of this PEIR and as such, in agreement with stakeholders, no impact assessment is included within this document. Full baseline data will be available and reported within the Hornsea Four ES.

Impacts on protected species during operation: operation and maintenance activities of the onshore substation could cause disturbance to protected species (ENC-O-13).

3.10.2.3 Baseline surveys are ongoing at the time of this PEIR and as such, in agreement with stakeholders, no impact assessment is included within this document. Full baseline data will be available and reported within the Hornsea Four ES.

3.10.3. Decommissioning

3.10.3.1 The impacts of onshore decommissioning of Hornsea Four have been assessed on ecology and nature conservation. The environmental impacts arising from the decommissioning of Hornsea Four are listed in [Table 3.13](#): along with the maximum design scenario against which each decommissioning phase impact has been assessed.

Impacts on habitats during decommissioning: decommissioning of the onshore substation could lead to temporary habitat loss or degradation (ENC-D-17).

3.10.3.2 The Hornsea Four OnSS is predominately situated within arable fields. Arable land is typically of low ecological value due to the homogeneity of the habitat alongside farming practices and the presence of herbicides and pesticides within crops. As such, arable land is considered to be of **negligible** importance. Potential impacts on arable land are further considered within [Chapter 6: Land Use and Agriculture](#).

3.10.3.3 The magnitude of this impact is considered to be **negligible**. Irrespective of the sensitivity of the receptor, the significance of the impact is **not significant** as defined in the assessment of significance matrix ([Table 3.16](#); [Volume 1, Chapter 5: EIA Methodology](#)) and is not considered further in this assessment.

3.10.3.4 Other habitats recorded adjacent to the Hornsea Four OnSS during the updated EP1HS include the following:

- Scrub; and
- Hedgerows;

3.10.3.5 Hornsea Four decommissioning plans currently consist of the dismantling of the OnSS. This would typically not involve a greater temporary land-take as that used during construction. Key considerations for determining the magnitude of the impact include the following parameters:

- The extent of habitat disturbance;
- The duration of habitat disturbance; and
- The timing of construction works.

3.10.3.6 The total maximum construction period for decommissioning is currently unknown, however it is anticipated to be similar to the construction period. Decommissioning would be subject to the same working practices, guidance and adherence to the projects' CoCP (Co124) and EMP (Co168) requirements. Furthermore, Co127 confirms that a Decommissioning Plan will be produced, which will outline and agree on the associated activities. Further details on relevant commitments that Hornsea Four has embedded within the project design that are applicable, these are shown in [Table 3.12: .](#)

3.10.3.7 The magnitude of the impact that construction activities relating to Hornsea Four will have on designated sites is considered to be **minor** in line with that assessed during construction, indicating that the potential is for minimal disturbance and/or loss of habitat, such that there is no loss of viability or function of the habitat.

Sensitivity of the receptor

3.10.3.8 The sensitivity of non-designated habitats is considered to be **low**, indicating that the receptor could potentially recover within the short term (e.g. 1 year).

Significance of the effect

3.10.3.9 Taking into consideration the commitments above, which include the adherence to the Outline CoCP (Volume F2, Chapter 2) (Co124) and Outline EMP) (Volume F2, Chapter 3) (Co168), in order to minimise the disturbance of non-designated sites, overall, it is predicted that the sensitivity of the receptor is **low**, and the magnitude is **minor adverse**. The effect is of not significant in EIA terms.

Impacts on protected species during decommissioning: decommissioning of the onshore substation could lead to temporary disturbance or displacement of protected species (ENC-D-18).

3.10.3.10 Baseline surveys are ongoing at the time of this PEIR and as such, in agreement with stakeholders, no impact assessment is included within this document. Full baseline data will be available and reported within the Hornsea Four ES.

3.11 Cumulative effect assessment (CEA)

3.11.1.1 Cumulative effects can be defined as effects upon a single receptor from Hornsea Four when considered alongside other proposed and reasonably foreseeable projects and developments. This includes all projects that result in a comparative effect that is not intrinsically considered as part of the existing environment.

3.11.1.2 The overarching method followed in identifying and assessing potential cumulative effects in relation to the onshore environment is set out in [Volume 4, Annex 5.5: Onshore Cumulative Effect Screening Matrix](#) and [Volume 4, Annex 5.6: Location of Onshore Cumulative Schemes](#). The approach is based upon the Planning Inspectorate (PINS) Advice Note 17: Cumulative Effects Assessment (PINS, 2017). The approach to the CEA is intended to be specific to Hornsea Four and takes account of the available knowledge of the environment and other activities around the PEIR boundary.

3.11.1.3 The CEA has followed a four-stage approach developed from Advice Note 17. Each of the four stages is identified in [Table 3.17](#) along with commentary specifically relating to ecology and nature conservation

Table 3.17 Stages and activities involved in the CEA process.

CEA stage	Activity
Stage 1 – Establish the project’s Zone of influence (Zol) and establish a long-list of developments	<p>Through consultation it has been identified that potential developments that need considering as part of the onshore CEA are restricted to those within the ERYC area. To determine a ‘long-list’ of possible projects for inclusion in the CEA the following actions have been carried out:</p> <ul style="list-style-type: none"> • Interrogation of the ERYC planning portal (latest review is May 2019); and • Discussion of potential projects for specific inclusion in the CEA at the Evidence Plan meetings. <p>The full list of projects and relevant tiers assigned can be found in Appendix A of Volume 4, Annex 5.5: Onshore Cumulative Effect Screening Matrix. The location of the projects is provided in Volume 4, Annex 5.6: Location of Onshore Cumulative Schemes.</p>
Stage 2 – Screening of long list: Identify a shortlist of	<p>A 1 km & 5 km buffer has been identified for the historic environment CEA to ensure direct (physical) and indirect (non-physical) cumulative effects can be appropriately identified and assessed. It is considered unlikely that significant effects greater than</p>

CEA stage	Activity
other developments for the CEA	these distances would occur given the impacts under assessment and the nature of this topic.
Stage 3 – Information gathering	Where available information on the other developments within the shortlist generated at Stage 2 has been collated to inform the CEA. At this stage (PEIR) information is of high level unless explicitly discussed with ERYC. The information collected on each project is presented in Volume 4, Annex 5.5: Onshore Cumulative Effect Screening Matrix and Volume 4, Annex 5.6: Location of Onshore Cumulative Schemes .
Stage 4 - Assessment	The CEA has been undertaken in two stages: <ol style="list-style-type: none"> I. Each of the potential effects that are subject to assessment alone have been reviewed against the potential for cumulative effects to occur. II. A CEA assessment of each of the other developments on the short-list has taken place for those effects where it is considered that potential cumulative impacts could occur.

3.11.1.4 A cumulative assessment in relation to ecology and nature conservation will take into account any identified project(s) to determine if there is a reasonable likelihood that any cumulative effects would result from their construction, operation or decommissioning when considered with Hornsea Four. Specifically, a review of such developments within a (5 km radius of onshore footprint) will be considered.

3.11.1.5 However, as baseline data collection is still ongoing at present, a full cumulative assessment has not been undertaken at this time. This will be reported fully once baseline data has been finalised, within the Hornsea Four ES.

3.12 Transboundary effects

3.12.1.1 A screening of transboundary impacts has been carried out and is presented in Appendix K of the Environmental Impact Assessment: Scoping Report (Ørsted, 2018). This screening exercise identified that there was no potential for significant transboundary effects regarding ecology and nature conservation from Hornsea Four upon the interests of other European Economic Area (EEA) States and this is not discussed further.

3.13 Inter-related effects

3.13.1.1 Inter-related effects consider impacts from the construction, operation or decommissioning of Hornsea Four on the same receptor (or group). The potential inter-related effects that could arise in relation to ecology and nature conservation conditions are presented in [Table 3.18](#). Such inter-related effects include both:

- Project lifetime effects: i.e. those arising throughout more than one phase of the project (construction, operation, and decommissioning) to interact to potentially create a more significant effect on a receptor than if just one phase were assessed in isolation; and

- Receptor led effects: Assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor (or group). Receptor-led effects might be short term, temporary or transient effects, or incorporate longer term effects.

3.13.1.2 A description of the process to identify and assess these effects is presented in [Section 2 of Volume 1, Chapter 5: EIA Methodology](#).

3.13.1.3 Due to the ongoing nature of the Phase 2 baseline survey data, no assessment has been undertaken with regard to inter-related effects on species in relation to onshore ecology and nature conservation. Additionally, in relation to habitats, as 50% survey access was achieved during the February 2019 EP1HS, an additional EP1HS will be undertaken in August and September 2019 after which an inter-related assessment will be undertaken in full in the Hornsea Four ES.

Table 3.18 Inter-related effects assessment for ecology and nature conservation conditions

Project phase(s)	Nature of inter-related effect	Assessment alone	Inter-related effects assessment
<i>Project-lifetime effects</i>			
Due to the ongoing nature of the Phase 2 baseline survey data, no assessment has been undertaken with regard to inter-related effects on species in relation to onshore ecology and nature conservation. Additionally, in relation to habitats, as 50% survey access was achieved during the February 2019 EP1HS, an additional EP1HS will be undertaken in August and September 2019 after which an inter-related assessment will be undertaken in full in the Hornsea Four ES			
<i>Receptor-led effects</i>			
Due to the ongoing nature of the Phase 2 baseline survey data, no assessment has been undertaken with regard to inter-related effects on species in relation to onshore ecology and nature conservation. Additionally, in relation to habitats, as 50% survey access was achieved during the February 2019 EP1HS, an additional EP1HS will be undertaken in August and September 2019 after which an inter-related assessment will be undertaken in full in the Hornsea Four ES			

3.14 Conclusion and summary

3.14.1.1 This chapter of the PEIR has assessed the potential impact of the onshore development of Hornsea Four on ecology and nature conservation. [Table 3.19](#): presents a summary of the significant impacts assessed within this PEIR, any mitigation and the residual effects.

3.14.1.2 At the time of compiling this PEIR, a number of ecological surveys are ongoing. As agreed at the Ecology Technical Panel Meeting in April 2019, no impact assessment would be undertaken within the PEIR for species with an incomplete baseline. This will be included within the Hornsea Four ES.

3.14.1.3 [Table 3.19](#) should be read in conjunction with the additional narrative included within [Section 3.10](#), which demonstrates that provided the mitigation measures and individual commitments are in place to prevent impact on those receptors from the project, potential

impacts are expected to be **minor** or **not significant** in relation to those ecological receptors that have been assessed at this stage.

Table 3.19: Summary of potential impacts assessed for Ecology and Nature Conservation.

Impact and Phase	Receptor and value/sensitivity	Magnitude and significance	Mitigation	Residual impact
<i>Construction</i>				
<p>Direct impacts on designated sites (ENC-C-1):</p> <p>Temporary construction areas could occupy areas leading to loss and/or degradation of designated sites</p>	<p>SSSI – High / Medium</p> <p>LWS – Medium / Medium</p>	<p>Minor</p> <p>Minor adverse</p>	Co2, Co114, Co168	Minor adverse
<p>Direct Impacts on non-designated sites (ENC-C-2):</p> <p>Construction compounds, access roads and other infrastructure will temporarily occupy areas leading to loss and/or degradation of non-designated habitats.</p>	Negligible / Low	<p>Minor</p> <p>Not significant</p>	Co2, Co26, Co27, Co114, Co168	Negligible adverse
<p>Direct impacts on bat species (ENC-C-3):</p> <p>Construction activities will temporarily occupy areas leading to loss and/or degradation of habitat and loss of habitat connectivity used by bats for roosting, commuting and/or foraging.</p>	High	Impacts to be assessed following completion of baseline data collection and will be fully reported within the Hornsea Four ES		
<p>Direct impacts on breeding and/or wintering bird species (ENC-C-4):</p>	High / Medium	<p>Negligible</p> <p>Minor adverse</p>	Co2, Co33, Co122, Co168	Over-wintering birds – minor adverse

Impact and Phase	Receptor and value/sensitivity	Magnitude and significance	Mitigation	Residual impact
<p>Activities will temporarily occupy areas leading to loss and/or degradation of habitat and loss of habitat connectivity used by breeding and/or wintering birds.</p>				<p>Impacts on breeding birds to be assessed following completion of baseline data collection and will be fully reported within the Hornsea Four ES</p>
<p>Impacts on otter and/or water vole (ENC-C-5):</p> <p>Open cut trenching and HDD used to cross watercourses with otter and/or water vole potential could lead to loss of habitat, disturbance and/or connectivity severance.</p>	<p>High</p>	<p>Impacts to be assessed following completion of baseline data collection and will be fully reported within the Hornsea Four ES</p>		
<p>Impacts on great crested newt populations (ENC-C-6):</p> <p>Works in or within 250 m of waterbodies with great crested newt potential could cause habitat loss, degradation, habitat severance and harm or kill individual animals.</p>	<p>High</p>	<p>Impacts to be assessed following completion of baseline data collection and will be fully reported within the Hornsea Four ES</p>		
<p>Impacts on reptiles (ENC-C-8):</p> <p>Construction activities will temporarily occupy areas leading to loss and/or degradation of habitat, loss of habitat</p>	<p>Medium / Low</p>	<p>Moderate</p> <p>Minor adverse</p>	<p>Co2, Co120, Co122, Co168</p>	<p>Minor adverse</p>

Impact and Phase	Receptor and value/sensitivity	Magnitude and significance	Mitigation	Residual impact
connectivity and harm or cause mortality to individual animals.				
Impacts on badgers (ENC-C-9): Construction activities could disturb badger setts and/or lead to temporary severance of badger territories.	High	Impacts to be assessed following completion of baseline data collection and will be fully reported within the Hornsea Four ES		
<i>Operation</i>				
Impacts on habitats or species (ENC-O-11): Operation of the onshore substation will cause long term habitat loss, degradation and potential displacement of protected species.		Impacts to be assessed following completion of baseline data collection and will be fully reported within the Hornsea Four ES		
Impacts on protected species (ENC-O-13): Operation and maintenance activities of the onshore substation could cause disturbance to protected species.		Impacts to be assessed following completion of baseline data collection and will be fully reported within the Hornsea Four ES		
<i>Decommissioning</i>				
Impacts on habitats could lead to temporary habitat loss or degradation (ENC-D-17).		Impacts to be assessed following completion of baseline data collection and will be fully reported within the Hornsea Four ES		
Impacts on protected species (ENC-D-18).		Impacts to be assessed following completion of baseline data collection and will be fully reported within the Hornsea Four ES		

Impact and Phase	Receptor and value/sensitivity	Magnitude and significance	Mitigation	Residual impact
Decommissioning of the onshore substation could lead to temporary disturbance or displacement of protected species (ENC-D-19).				

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