



# Hornsea Four: Preliminary Environmental Information Report (PEIR)

## Volume 2, Chapter 12: Infrastructure and Other Users

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Doc. no. A2.12  
Version A

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## Glossary

Term	Definition
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 Environmental Impact Assessment (EIA) (e.g. at Scoping or Preliminary Environmental Information Report (PEIR)). The purpose of Commitments is to reduce and/or eliminate Likely Significant Effects (LSEs), in EIA terms.
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.
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 Impact Assessment (EIA) Report.
Export cable corridor (ECC)	The specific corridor of seabed (seaward of Mean High Water Springs (MHWS)) and land (landward of MHWS) from the Hornsea Project Four array area to the Creyke Beck National Grid substation, within which the export cables will be located.

Term	Definition
Export cables	Cables that transfer power from the offshore substation(s) or the converter station(s) to shore.
High Voltage Alternating Current (HVAC)	High voltage alternating current is the bulk transmission of electricity by alternating current (AC), whereby the flow of electric charge periodically reverses direction.
High Voltage Direct Current (HVDC)	High voltage direct current is the bulk transmission of electricity by direct current (DC), whereby the flow of electric charge is in one direction.
HVAC booster station(s)	Offshore HVAC booster station(s) are required in HVAC transmission systems only; they are not required in HVDC transmission systems. If required for Hornsea Four, they would be located entirely offshore.
Marine Pollution Contingency Plan (MPCP)	A document addressing the risks, methods and procedures to deal with spills and collusion incidents during the construction, and operation and maintenance phase.
Maximum design scenario (MDS)	The maximum design parameters of each Hornsea Four asset (both on and offshore) considered to be a worst case for any given assessment.
Mean High Water Spring (MHWS)	The height of mean high water springs is the average throughout the year (when the average maximum declination of the moon is 23.5°) of two successive high waters during those periods of 24 hours when the range of the tide is at its greatest.
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).
National Policy Statement (NPS)	A document setting out national policy against which proposals for NSIPs will be assessed and decided upon.
Offshore accommodation platform(s)	Used to accommodate multiple Operations & Maintenance (O&M) staff for a number of weeks at a time and to allow spares and tools to be stored within the array area.
Offshore substation(s)	One or more offshore substations to convert the power to higher voltages and/or to HVDC and transmit this power to shore.
Orbis Energy Limited	Energy consultant that engaged in pre-application consultation with oil and gas stakeholders.
Hornsea Four	The proposed Hornsea Project Four offshore wind farm project; the term covers all elements within the Development Consent Order (i.e. both the offshore and onshore components).
Project Environmental Management and Monitoring Plan (PEMMP)	This plan provides environmental risk analysis covering the MPCP, waste management, chemical risk assessment, offshore maintenance plans, details of Archaeological Exclusion Zones (AEZ), seasonal and working restrictions, and protocol for the appointment of Fisheries and Environmental Liaison Officers.
Receptor	A component of the natural or man-made environment that is affected by an impact, including people.
Sea room	The unfettered space needed to safely operate which has to include space for manoeuvring, space for anchors to clear pathways to stand by and drift off positions and space for additional associated vessels (e.g. tugs and/or anchor handlers).
the Hornsea Four array area	The Crown Estate agreement for lease (Afl) area. Note, this is not the same as the 'Study Area' which is defined on a receptor specific basis and is defined elsewhere in this table.

Term	Definition
The Secretary of State for Business, Energy and Industrial Strategy	The ultimate decision maker with regards to Hornsea Four's application for Development Consent.
Wind turbine	All of the components of a wind turbine, including the tower, nacelle, and rotor
Wind turbine foundation	The wind turbines are attached to the seabed with a foundation structure typically fabricated from steel or concrete.

## Acronyms

Acronym	Definition
AIS	Automatic Information System
ALARP	As Low as Reasonably Practicable
CAA	Civil Aviation Authority
CEA	Cumulative Effect Assessment
CCS	Carbon Capture Storage
CPA	Closest Point of Approach
CDA	Common Data Access
DCO	Development Consent Order
DECC	Department for Energy and Climate Change
ECC	Export Cable Corridor
EEA	European Economic Area
EIA	Environmental Impact Assessment
ES	Environmental Statement
GIS	Geographical Information System
HMR	Helicopter Main Route
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IPC	Infrastructure and Planning Commission
LAT	Lowest Astronomical Tide
LOS	Line of Sight
MCA	Maritime and Coastal Agency
MDS	Maximum Design Scenario
MHWS	Mean High Water Spring
MOD	Ministry of Defence
MPCP	Marine Pollution Contingency Plan
MSL	Mean Sea Level
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
NRA	Navigational Risk Assessment
NtM	Notice to Mariners
NUI	Normally Unmanned Installations
OGA	Oil and Gas Authority
OREI	Offshore Renewable Energy Installations
PEIR	Preliminary Environmental Information Report

Acronym	Definition
PEMMP	Project Environmental Monitoring and Management Plan
PEXA	Practice and Exercise Area
PINS	Planning Inspectorate
REWS	Radar Early Warning System
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association
SIMOPS	Simultaneous Operations
SoS	Secretary of State
TCPA	Time to Closest Point to Approach
UKCS	UK Continental Shelf
UKHO	UK Hydrographic Office

## Units

Unit	Definition
dB	Decibels
Hz	Hertz
m	Metre
m <sup>2</sup>	Metre squared
nm	Nautical mile
kJ	Kilojoule
km	Kilometre
km <sup>2</sup>	Kilometre squared

## 12.1 Introduction

- 12.1.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the preliminary assessment of the impacts of the Hornsea Project Four offshore wind farm (hereafter Hornsea Four) on Infrastructure and Other Users, with the primary focus on impacts on oil and gas operators and assets.
- 12.1.1.2 This chapter considers the potential impacts on Infrastructure and Other Users as a consequence of the construction, operation and maintenance, and decommissioning phases of Hornsea Four, seaward of Mean High-Water Springs (MHWS).
- 12.1.1.3 Orsted Hornsea Project Four Limited (the Applicant) is proposing to develop Hornsea Four. Hornsea Four will be located approximately 65 km from the East Riding of Yorkshire in the Southern North Sea and will be the fourth project to be developed in the former Hornsea Zone (please see [Volume 1, Chapter 1: Introduction](#) for further details on the Hornsea Zone). 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 (please see [Volume 1, Chapter 4: Project Description](#) for full details on the Project Design).

## 12.2 Purpose

- 12.2.1.1 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 Development Consent Order (DCO) pre-application consultation activities required under the Planning Act 2008.
- 12.2.1.2 The feedback from this consultation will be used to inform the final project design and the associated EIA (which will be reported in an Environmental Statement (ES)) that will accompany the DCO application to the Planning Inspectorate (PINS).
- 12.2.1.3 This PEIR chapter:
- Summarises relevant policy;
  - Summarises relevant consultation completed to date;
  - Presents the existing environmental baseline established from desk studies, and informed by consultation;
  - Presents the potential effects arising from Hornsea Four (for those matters scoped into the EIA), based on the information gathered;
  - Outlines the proposed approach to the assessment of potential impacts on oil and gas receptors that will be presented as part of the final DCO application;
  - Identifies any assumptions and limitations encountered in compiling this preliminary environmental information; and
  - Highlights any necessary monitoring and/or mitigation measures which could prevent, minimise, reduce or offset the possible environmental effects identified to date.



## 12.3 Oil and Gas Assessment Strategy

12.3.1.1 This chapter does not provide an assessment of the potential impacts on oil and gas receptors as the Applicant is currently undertaking further assessments in response to those issues raised during consultation with relevant oil and gas operators. A full oil and gas assessment will accompany the final DCO application, as an appendix to the main ES (or alternatively a separate application document) as well as being summarised in the in 'Infrastructure and Other Users' chapter of the ES.

12.3.1.2 The proposed assessment approach is designed to reflect the recent experiences of offshore windfarm developments in the southern North Sea and associated issues raised by oil and gas operators. The oil and gas assessment will be based upon the experience gained from previous offshore wind farm DCO applications and examinations, but primarily informed by ongoing consultation with the relevant oil and gas operators which will seek to agree the approach to the form of the assessment of the potential impacts on oil and gas interests.

12.3.1.3 The aim of this PEIR chapter is, therefore, primarily to provide a comprehensive baseline relating to oil and gas assets and operations in the vicinity of Hornsea Four, as informed by early consultation with the relevant operators, to identify the potential impacts upon oil and gas interests and to set out in broad terms the anticipated approach to and scope of the oil and gas assessment. Further details on the potential impacts that will be subject to consideration are set out under [Section 12.10](#) and subsequently considered under [Section 12.10](#), but in broad terms will give consideration to the following:

- Aviation:
  - Potential impacts on helicopter access to existing platforms;
  - Potential impacts on helicopter access to vessels (such as drilling rigs, diving support vessels, seismic vessels, heavy lift crane barges or accommodation units operating in the vicinity of platforms and/or subsea assets);
  - Potential impacts on helicopter main routes (HMRs); and
  - Potential impacts of Hornsea Four helicopter operations on the available airspace for O&G related helicopter operations.
- Navigation:
  - Proximity of Hornsea Four to O&G infrastructure and vessels and rigs supporting O&G operations in regard to Shipping and Navigation;
  - Potential collision/allision risk due to vessels being deviated by Hornsea Four; and
  - Potential impacts on platform anti –collision safety systems (REWS).
- Future Development:
  - Potential impacts on potential future exploration, appraisal and development activity and impacts on the maximisation of economic recovery from the UKCS (MERUK), incorporating:
    - Future seismic surveys;
    - Future exploratory drilling; and
    - Future development and placement of surface or subsea infrastructure.

- Other matters:
  - Potential interference of Hornsea Four turbines disrupting O&G communications; and
  - The potential impacts of piling at Hornsea Four on the safety of diving operations that may be required at O&G assets.

12.3.1.4 The assessment will be completed by suitably qualified consultants with an understanding of the oil and gas industry (and specialists in the fields of helicopter operations, navigational risk and Radar Early Warning Systems (REWS)) and will adopt a methodology familiar to the oil and gas industry. Where appropriate the assessment will identify additional, potential mitigation and controls to manage the potential impacts of Hornsea four on each of the operators and assets in the vicinity of the Hornsea Four array and ECC.

## 12.4 Policy Context

12.4.1.1 Planning policy on offshore wind Nationally Significant Infrastructure Projects (NSIPs), specifically in relation to Infrastructure and Other Users, is contained in the National Policy Statement (NPS) for Renewable Energy Infrastructure (EN-3, Department for Energy and Climate Change (DECC), 2011). NPS EN-3 includes guidance on what matters are to be considered in the assessment, as well as the decision-making process and mitigation considerations, when applying for a DCO for an offshore wind farm. These are summarised in [Table 12.1](#) below.

**Table 12.1: Summary of NPS EN-3 provisions relevant to oil and gas receptors and where considered in this PEIR chapter.**

Summary of NPS EN- 3 provisions	How and where considered in the PEIR
Paragraph 2.6.179 notes that <i>“applicants should undertake an assessment of the potential effect of the proposed development on existing or permitted offshore infrastructure or activities.”</i>	<a href="#">Table 12.13</a> of this PEIR chapter provides the preliminary appraisal of the potential effects on existing or proposed offshore infrastructure (with the scope of the assessment being focused on oil and gas infrastructure and operations in line with the SoS Scoping Opinion).
Paragraphs 2.6.180 – 2.6.181 note that <i>“applicants should engage with interested parties in the potentially affected offshore sector early in the development phase of the proposed offshore wind farm, with an aim to resolve as many issues as possible prior to the submission of an application. Such stakeholder engagement should continue throughout the life of the development.”</i>	Consultation with potentially affected stakeholders has been carried out from the early stages of the project and will continue through the remaining pre-application period (as well as throughout the life of Hornsea Four). Details of the consultation completed to date are summarised in <a href="#">Section 12.5</a> .

Summary of NPS EN- 3 provisions	How and where considered in the PEIR
<p>Paragraph 2.6.182 and 2.6.183 notes that <i>“there are statutory requirements concerning automatic establishment of navigational safety zones relating to offshore petroleum developments and that, where a proposed offshore wind farm potentially affects other offshore infrastructure or activity, a pragmatic approach should be employed; the Applicant should be expected to minimise negative impacts and reduce risks to as low as reasonably practicable.”</i></p>	<p>The potential impacts of Hornsea Four on other offshore assets and operators are set out under <a href="#">Section 12.10</a>; the proposed approach to developing an assessment of these impacts to support the final application is set out in <a href="#">paragraph 12.10.1.4</a>; designed in mitigation and controls are set out under <a href="#">Section 12.8.16</a>.</p>
<p>Paragraph 2.6.184 notes that <i>“applicants should ensure site selection and site design of the proposed offshore wind farm has been made with a view to avoiding or minimising disruption or economic loss or any adverse effect on safety to other offshore industries (applications that pose unacceptable risks to safety after mitigation measures have been considered should not be consented).”</i></p>	<p>Hornsea Four has been sited to minimise, as far as possible, disruption to existing Infrastructure and Other Users. In cases where there is the potential for significant adverse effects on other offshore industries (following completion of the proposed detailed assessment approach set out under <a href="#">paragraph 12.10.1.4</a>), the Applicant will, in consultation with relevant operators, seek appropriate controls to reduce risks to as low as reasonably practicable. See also <a href="#">Volume 1, Chapter 3: Site Selection and Consideration of Alternatives</a>.</p>
<p>Paragraph 2.6.185 notes that <i>“where a proposed development is likely to affect the future viability or safety of an existing or approved/licensed offshore infrastructure or activity, these adverse effects should be given substantial weight in the decision-making process.”</i></p>	<p>The potential impacts of Hornsea Four on other offshore assets and operators are set out under <a href="#">paragraph 12.10.1.4</a>; the proposed approach to developing an assessment of these impacts to support the final application is set out in <a href="#">Section 12.10</a>; designed in mitigation and controls are set out under <a href="#">Section 12.8.16</a>. The final application will include a full appraisal of the potential impacts on future viability and safety.</p>
<p>Paragraph 2.6.186 notes that <i>“where schemes have been carefully designed and the necessary consultation has been undertaken at an early stage, mitigation measures may be found that can negate or reduce effects on other offshore infrastructure or operations to a level sufficient to enable the Secretary of State to grant consent.”</i></p>	<p>The potential impacts of Hornsea Four on other offshore assets and operators are set out under <a href="#">Section 12.10</a>; the proposed approach to developing an assessment of these impacts to support the final application is set out in <a href="#">paragraph 12.10.1.4</a>; designed in mitigation and controls are set out under <a href="#">Section 12.8.16.1</a>. In cases where there is the potential for significant adverse effects on other offshore industries (following completion of the proposed detailed assessment approach set out under <a href="#">Section 12.3</a>), the Applicant will, in consultation with relevant operators, seek appropriate controls to reduce risks to as low as reasonably practicable.</p>
<p>Paragraph 2.6.187 notes in relation to mitigation that <i>“detailed discussions between the applicant and the relevant consultees should have progressed as far as reasonably possible prior to the submission of an application. As such, appropriate mitigation should be included in any application and ideally agreed between relevant parties.”</i></p>	<p>In cases where there is the potential for significant adverse effects on other offshore industries (following completion of the proposed detailed assessment approach set out under <a href="#">paragraph 12.10.1.4</a>), the Applicant will, in consultation with relevant operators, seek appropriate controls to reduce risks to as low as reasonably practicable; these will be detailed in the final application.</p>

Summary of NPS EN- 3 provisions	How and where considered in the PEIR
Paragraph 2.6.188 notes that <i>“in some circumstances, the Infrastructure Planning Commission (IPC) may wish to consider the potential to use requirements involving arbitration as a means of resolving how adverse impacts on other commercial activities will be addressed.”</i>	This is noted by the Applicant.

12.4.1.2 The East (Inshore and Offshore) Marine Plans: Oil and Gas Policy OG1 states that “Proposals within areas with existing oil and gas production should not be authorised except where compatibility with oil and gas production and infrastructure can be satisfactorily demonstrated” and this will be considered in the development of the assessment on the oil and gas industry which will be presented in the final DCO application.

## 12.5 Other Policy and Guidance

12.5.1.1 In addition to the NPSs and Marine Plans, there is a variety of other policy and guidance documents which may be relevant to the consideration of impacts on the oil and gas industry; the following list provides examples of potentially relevant policies and guidance which will be given further consideration in completing the oil and gas assessment for the final ES:

- Offshore Installations (Offshore Safety Directive) (Safety Case etc) Regulations 2015;
- Offshore Installations and Pipeline Works (Management and Administration) Regulations 1995;
- CAP 764 Civil Aviation Agency (CAA) Policy and Guidelines on Wind Turbines;
- Safety of Navigation: Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response Navigational Practice, Safety and Emergency Response;
- Petroleum Act 1987;
- Maritime and Coastal Energy (MCA) - Methodology for assessing the marine navigational safety & emergency response risks of offshore renewable energy installations; and
- Offshore Installations (prevention of Fire and Explosion, and Emergency Response) Regulations 1995).

## 12.6 Consultation

12.6.1.1 Consultation is a key part of the DCO pre-application process. Consultation regarding Infrastructure and Other Users has been conducted through preparation of the Scoping Report (Ørsted, 2018) and the subsequent scoping process, and through informal consultation with relevant offshore operators. An overview of the project consultation process is presented within [Volume 1, Chapter 6: Consultation](#).

12.6.1.2 Specifically, Orbis Energy Limited (hereafter Orbis) were engaged to undertake informal consultation with relevant oil and gas operators to identify, amongst other things, the current and proposed infrastructure and activities in the vicinity of Hornsea Four. It should

be noted that this informal consultation was undertaken using the broader Hornsea Four scoping boundary (i.e. a larger project development area than is now being considered in this PEIR).

12.6.1.3 The informal consultation completed by Orbis was conducted in two phases:

- An initial questionnaire was sent to relevant oil and gas operators in order to gather relevant information concerning assets, current activities, proposed activities, access requirements and aviation requirement; and
- Following analysis of the responses to the questionnaires, initial consultation meetings were undertaken with relevant oil and gas operators.

12.6.1.4 The pre-application consultation completed to date is summarised in [Table 12.2](#).

**Table 12.2: Consultation responses and where addressed in PEIR.**

Consultee	Date, Document, Forum	Comment	Where addressed in the PEIR
PINS	November 2018, Scoping Opinion, ID 4.12.1	The Planning Inspectorate agreed that there are unlikely to be significant effects associated with aggregate dredging activities; The Inspectorate was content that this matter can be scoped out of the ES.	Impacts on aggregate dredging operations have been scoped out from further consideration in the EIA process. Further justification is considered in <a href="#">Section 12.8.15</a> .
PINS	November 2018, Scoping Opinion, ID 4.12.2	The Planning Inspectorate stated that there is little information to explain whether construction activities and/or operational restrictions to access would affect the operation of the disposal site. If significant effects are likely to occur in this regard these should be assessed within the ES.	Impacts on the disposal site have been scoped out from further consideration in the EIA process. Further justification is considered in <a href="#">Section 12.8.15</a> .
PINS	November 2018, Scoping Opinion, ID 4.12.3	As there are currently no active 'Carbon Capture Storage' (CCS) projects that would make use of the Endurance reservoir, the Planning Inspectorate agreed to scope out this matter (this position should be reviewed as the cumulative effect assessment for Hornsea Four is refined).	Impacts on the CCS projects have been scoped out from further consideration in the EIA process. Further justification is considered in <a href="#">Section 12.8.15</a> .
PINS	November 2018, Scoping Opinion, ID 4.12.4, 4.12.5 and 4.12.6.	The Planning Inspectorate agreed that impacts on cables and pipelines do not need to be included within the scope of the ES.	Impacts on existing and proposed pipelines and cables (excluding oil and gas assets) are scoped out from further consideration in the EIA process. Further justification is considered in <a href="#">Section 12.8.15</a> .

Consultee	Date, Document, Forum	Comment	Where addressed in the PEIR
Actis Oil and Gas	2 January 2019, Pre-application Consultation Questionnaire via Email Correspondence.	Actis Oil & Gas confirmed the location of their current assets. They stated that desk studies were currently underway on the licence areas and there are currently no planned activities in the licence blocks relevant to Hornsea Four. It was determined that there was no need for a follow-up consultation meeting at this time.	No action required
Cluff Natural Resources	23 January 2019, Pre-application Consultation Questionnaire via Email Correspondence.	Cluff Natural Resources confirmed the location of their current assets. It was confirmed that desk studies were currently underway on their licence areas, however there are no concrete plans at present. It was determined by both parties that there was no need for a follow-up consultation meeting at this time.	No further consideration will be given to the Cluff Natural Resources interests at the PEIR stage.
The Coal Authority	Pre-application Consultation Email Correspondence	Following email correspondence, the Coal Authority confirmed that they had no concerns about the proposed construction of Hornsea Four	Impacts on Coal Authority interests will now be scoped out of from further consideration in the EIA process.
Gassco	26 December 2018, Pre-application Consultation Questionnaire via Email Correspondence.	Gassco is the operator of the Langled pipeline that crosses the proposed HVAC booster station search area. Gassco advised that external visual and multi-beam echo sounder surveys using surface vessels are ongoing along the pipeline and will require continued vessel access. Gassco agreed to detail a proposed draft proximity agreement and a proposed draft crossing agreement for the cable crossing when this is deemed necessary.	Gassco assets and planned activity are considered in the baseline detailed in <a href="#">Section 12.8.2</a> .  With the embedded mitigation detailed in <a href="#">Section 12.8.16</a> , impacts on Gassco assets will now be scoped out of from further consideration in the EIA process. Further justification is considered in <a href="#">Section 12.8.15</a> .
The Oil & Gas Authority (OGA)	Pre-application Consultation Email Correspondence	OGA confirmed that they had no concerns or comments to make on Hornsea Four, other than to request that Ørsted consult and take on board comments made by petroleum licence holders within or in the vicinity of Hornsea Four.	Noted, no further action required.

Consultee	Date, Document, Forum	Comment	Where addressed in the PEIR
Shell	18 January 2019, Pre-application Consultation Questionnaire via Email Correspondence.	Shell is the operator of the Shearwater to Bacton pipeline that traverses the eastern section of the PEIR array area. Shell detailed their requirements for vessels to access the pipeline for maintenance and ad hoc work. It was determined that there was no need for a follow-up consultation meeting at present; however future technical meetings regarding the placement of turbines and how this will impact access to the pipeline are likely to be necessary.	Shell's assets are considered in the baseline detailed in <a href="#">Section 12.8.2</a> .  With the embedded mitigation detailed in <a href="#">Section 12.8.16</a> , impacts on Shell assets will now be scoped out of from further consideration in the EIA process. Further justification is considered in <a href="#">Section 12.8.16</a> .
BP plc.	4 February 2019, Pre-application Consultation via Email and Telephone Correspondence	BP confirmed that they no longer hold any licences in this region of the southern North Sea (previously held interests now operated by Perenco). Therefore, no further consultation is deemed to be necessary by both parties	Noted; no further consultation will be undertaken with BP; see Perenco below.
Holywell Resources	Attempted consultation via Email and Telephone Correspondence: 20 December 2018, 3 15 and 21 January 2019.	As of March 2019, the Applicant became aware that Holywell has recently relinquished the interest in all three of their previously held licence blocks in the vicinity of the Hornsea Four array area.	Noted; no further consultation will be undertaken with Holywell. In the event that another operator acquires these licence blocks during a future OGA licencing round, they will be reconsidered for the final application as necessary and relevant.
Alpha Petroleum	8 April 2019, Pre-application Consultation Meeting	Alpha Petroleum is the licence holder of UKCS Blocks 42/25a & 43/21a, located north of the PEIR array area, Block 43/22a located to the northeast of the PEIR array area and Block 47/10a, located to the south of Hornsea Four. Alpha is also the owner of the Garrow and Kilmar Normally Unmanned Installations (NUIs), however Perenco is the operator of all their assets. Decommissioning of these platforms is expected to occur in 2024. Alpha confirmed the potential for a proposed pipeline between Kilmar NUI and the Ravenspurn North Hub. Alpha also confirmed that Perenco are likely to be the operator of this pipeline. The current route of the pipeline is unknown; however, it is likely that this pipeline route will pass through the Hornsea Four array area to reach to Ravenspurn North Hub. If the pipeline is agreed, construction could potentially take place in	Alpha Petroleum's assets are considered in the baseline in <a href="#">Section 12.8.2</a> .  With the suggested embedded mitigation, including crossing and proximity agreements that will be agreed with the operators of existing pipeline and cables, the Applicant will ensure access for cable or pipeline repair and maintenance; as such this potential issue is not considered further. This is discussed in <a href="#">Section 12.8.15</a> .  Potential impacts arising from aviation access and flight

Consultee	Date, Document, Forum	Comment	Where addressed in the PEIR
		2020. Alpha Petroleum raised concerns about aviation access and flight paths as Alpha will require future access to both platforms by helicopter and supply vessel. The potential for Simultaneous Operations (SIMOPS) between Alpha and Hornsea Four was discussed in relation to decommissioning activities at Garrow and Kilmar which have the potential to take place within the same time as Hornsea Four construction.	paths are described in <a href="#">Section 12.10.4</a> .
Bridge Petroleum	7 January 2019, Pre-application Consultation Questionnaire via Email Correspondence	Bridge Petroleum is the primary equity holder (100%) of UKCS Blocks 42/30d & 43/26c, located within the north-western extent of the proposed Hornsea Four array area. As these blocks do not have a licence operator, Bridge Petroleum was contacted as a stakeholder in their stead. A follow-up consultation meeting was scheduled between Hornsea Four and Bridge Petroleum.	Bridge Petroleum assets are considered in the baseline in <a href="#">Section 12.8.2</a> .
Bridge Petroleum	12 February 2019, Consultation Meeting	Bridge Petroleum provided information relating to Blocks 42/30d and 43/26c which contain a known field (Kumatage) and reservoir, with an estimated field life of seven years. They confirmed plans to drill up to three wells but there are currently no concrete plans or timelines for the drilling which is likely to be Block 42/30d. Production would be via a subsea wellhead or a NUI (with a platform more likely). Potential for shared operations was discussed.	
Conoco Phillips	7 January 2019, Pre-application Consultation Questionnaire via Email Correspondence	ConocoPhillips provided details on their infrastructure and activities. A follow-up consultation meeting was then scheduled between Hornsea Four and ConocoPhillips.	Conoco Phillips assets and decommissioning plans are considered in the baseline in <a href="#">Section 12.8.2</a> .
Conoco Phillips	12 February 2019, Consultation Meeting	ConocoPhillips detailed the location of their Theddlethorpe to Murdoch gas and methanol pipelines which traversed through the south-eastern corner of the Hornsea Four Scoping Area. However, with the reduced PEIR boundary there is now no longer any overlap. ConocoPhillips are currently in the process of decommissioning all their assets in the southern	With the suggested embedded mitigation, including crossing and proximity agreements that will be agreed with the operators of existing pipeline and cables, the Applicant will ensure access for cable or pipeline repair and maintenance; as such this



Consultee	Date, Document, Forum	Comment	Where addressed in the PEIR
		North Sea, following the cessation of production in August 2018; no decommissioning programme has been finalised. There are no current plans for future developments in the vicinity of Hornsea Four. ConocoPhillips detailed their access requirements for their pipeline for maintenance and remediation works. ConocoPhillips set out requirements for appropriate protections in relation to proximate or crossing operations on the pipeline, such as crossing and/or proximity agreements.	potential issue is not considered further. This is discussed in <a href="#">Section 12.8.15</a> .
Dana Petroleum	5 February 2019, Pre-application Consultation Questionnaire via Email Correspondence	Dana Petroleum provided details on their infrastructure and activity in the vicinity of Hornsea Four. Dana Petroleum is the licence operator of UKCS Blocks 42/27a, 47/2c & 47/3i (P1896), located within the proposed PEIR cable corridor (the licence for Block 42/27a has currently lapsed but a re-application will be made in 2019). A follow-up consultation meeting was then scheduled between the Applicant and Dana Petroleum.	Dana Petroleum assets are considered in the baseline in <a href="#">Section 12.8.2</a> .
Dana Petroleum	14 March 2019, Pre-application Consultation Meeting	Dana provided details of their Platypus Project in Block 48/1a that will involve development drilling, pipeline installation and the installation of a small NUI. The projected field life is 16 years. The Platypus Project is currently in the Host Selection Phase, which is due to be decided in April 2019. A number of surveys are planned.	Dana Petroleum assets are considered in the baseline in <a href="#">Section 12.8.2</a> .
Perenco UK Limited	7 January 2019, Pre-application Consultation Questionnaire via Email Correspondence	Perenco provided details on infrastructure and activities in the vicinity of Hornsea Four including several licence blocks and infrastructure including four Manned Platforms and 10 Unmanned Platforms. A follow-up meeting was scheduled between the Applicant and Perenco.	Perenco's assets are considered in the baseline in <a href="#">Section 12.8.2</a> .  The potential impacts on vessel and helicopter access are described in <a href="#">Section 12.10.3</a> and <a href="#">12.10.4</a> respectively. Potential impacts on future access and development are described in <a href="#">Section 12.10.4</a> .
Perenco UK Limited	28 February 2019, Pre-application Consultation Meeting	Perenco gave an overview of their assets and current infrastructure in the southern North Sea, with special focus on the Ravenspurn North Hub which lies within the scoping boundary area, within 1 km of the PEIR boundary and will remain in production for at least the next 10 years. There are as yet unconfirmed plans to	

Consultee	Date, Document, Forum	Comment	Where addressed in the PEIR
		<p>build a pipeline between Kilmar NUI (Alpha Petroleum) and the Ravenspurn North Hub; if agreed, the earliest start date would be 2020. It is likely, but not yet confirmed, that the pipeline would pass through the Hornsea Four array area. Power cables from Cleeton to Ravenspurn North are also being considered (with a number of third-party operators considering connecting into Ravenspurn North; no plans have been finalised). Perenco raised a number of concerns in relation to Hornsea Four, primarily relating to access issues (for pipelines, platforms, communications and licence blocks). This included helicopter access to platforms, and access to licence blocks for development work including drilling. Concerns over the use of high voltage cables by Hornsea Four and the crossing of pipelines were also raised in relation to effects on cathode protection.</p>	<p>With the suggested embedded mitigation, including crossing and proximity agreements, that will be agreed with the operators of existing pipeline and cables, the Applicant will ensure access for cable or pipeline repair and maintenance; as such this potential issue is not considered further. This is discussed in <a href="#">Section 12.8.15</a>.</p>
Premier Oil	30 October 2018, Pre-application Consultation Meeting	<p>Premier Oil initiated contact with Hornsea Four in summer 2019. Premier Oil is the licence holder of several UKCS Blocks located within Hornsea Four. An initial consultation meeting was held to discuss potential interactions between Hornsea Four and Premier's Tolmount platform (construction planned for May 2020) in Block 42/28d, located near to the proposed ECC, as well as the Johnston field, located within the proposed array area.</p>	<p>Premier Oil's assets are considered in the baseline in <a href="#">Section 12.8.2</a>.</p> <p>With the suggested embedded mitigation, including crossing and proximity agreements, that will be agreed with the operators of existing pipeline and cables, the Applicant will ensure access for cable or pipeline repair and maintenance; as such this potential issue is not considered further. This is discussed in <a href="#">Section 12.8.15</a>.</p>
Premier Oil	5 December 2018, Pre-application Consultation Meeting	<p>The planned surveys in the Tolmount area were discussed as well as the potential for SIMOPS between the two parties. The Applicant re-scheduled planned surveys, co-ordinating with Premier's planned surveys in the region. It was agreed that further meetings would be held between the two parties.</p>	<p>With the suggested embedded mitigation, including crossing and proximity agreements, that will be agreed with the operators of existing pipeline and cables, the Applicant will ensure access for cable or pipeline repair and maintenance; as such this potential issue is not considered further. This is discussed in <a href="#">Section 12.8.15</a>.</p>
Premier Oil	27 June 2019, Pre-application Consultation Meeting	<p>Premier Oil confirmed the Tolmount received consent and construction is planned for May 2020. They also informed the Applicant that the Johnston infrastructure is likely to be decommissioned, but no timescales were provided. However, publicly available information suggests expected</p>	<p>Premier Oil's assets are considered in the baseline in <a href="#">Section 12.8.2</a>.</p>

Consultee	Date, Document, Forum	Comment	Where addressed in the PEIR
		decommissioning is expected 2019 – 2021 (Premier Oil, 2016)	
Speedwell Energy	5 February 2019, Pre-application Consultation Questionnaire via Email Correspondence	Speedwell Energy is the licence operator of UKCS Block 43/21b, located approximately 2.8 km (1.5 nm) to the north of the Hornsea Four array area. A follow-up consultation meeting was scheduled between the Applicant and Speedwell Energy.	Speedwell Energy's assets are considered in the baseline in <a href="#">Section 12.8.2</a> .  With the suggested embedded mitigation, including crossing and proximity agreements, that will be agreed with the operators of existing pipeline and cables, the Applicant will ensure access for cable or pipeline repair and maintenance; as such this potential issue is not considered further. This is discussed in <a href="#">Section 12.8.15</a> .
Speedwell Energy	5 March 2019, Pre-application Consultation Meeting	Speedwell outlined proposed plans to drill two wells in Block 43/21b, drilling potentially commencing in mid-2020 and the potential for a pipelay in 2020. Both are likely subsea, connecting to the Ravenspurn North platform by pipeline. Speedwell are likely to be the well and pipeline operator. The current route of the pipeline is unknown, but if these plans go ahead, it is likely that the pipeline would pass through the Hornsea Four array area with a route survey planned for Q2 2019.	
Spirit Energy	21 May 2019, Pre-application Consultation Questionnaire via Email Correspondence	Spirit Energy is the operator of various licences and infrastructure in the southern North Sea, including UKCS Blocks 48/2 & 48/3 in the vicinity of both the array area and ECC. It was agreed that both parties wished to meet to discuss potential impacts on the Babbage platform and exploration licences held by Spirit, for which they have obligations to drill.	Spirit Energy's assets are considered in the baseline in <a href="#">Section 12.8.2</a> .  Helicopter access and requirement of Spirit Energy are detailed in <a href="#">Section 12.8.2</a> with potential impacts on aviation receptors detailed in <a href="#">Section 12.10.4</a> .
Spirit Energy	30 May 2019, Pre-application Consultation Meeting	Spirit Energy provided Ørsted with an overview of their assets located within Hornsea Four array area. They are currently in the process of relinquishing some of the licences (blocks and sub-blocks) currently held within the array area. There is also the potential for decommissioning in the future, but with no firm plans at present. The potential for exploration drilling within the licence blocks that Spirit hold in the area was discussed, although there are no firm plans to do so at present.  Spirit confirmed that the Babbage platform does not possess Radar Early Warning Systems (REWS). Spirit detailed their access requirements to their Babbage platform including both vessel	

Consultee	Date, Document, Forum	Comment	Where addressed in the PEIR
		and aviation. They requested input into the assessment process that will be applied in assessing impacts on their interests and assets, with the aim to reach agreement on the methodology.	

## 12.7 Methodology to inform the baseline

### 12.7.1 Desktop Study

12.7.1.1 Information on oil and gas activity within the Hornsea Four study areas (defined in [Figure 12.1](#)) was collected through a detailed desktop review of existing studies and datasets, as detailed in [Table 12.1](#) and supplemented by information provided by oil and gas operators during the informal consultation process summarised in [Table 12.2](#).

**Table 12.3: Key Sources of Oil and Gas Data.**

Source	Summary	Coverage of Hornsea Four Development Area
OGA Data/ Common Data Access (CDA)	Publicly available Geographical Information System (GIS) data, details on the oil and gas licencing rounds and UK oil and gas activity.	Full coverage of the Hornsea Four Infrastructure and Other Users study areas, as illustrated in <a href="#">Figure 12.1</a> .
Consultation with oil and gas operators	Consultation with oil and gas operators informed the Applicant on the operators' current and proposed activity.	Full coverage of the Hornsea Four scoping boundary and a 9 nm consultation buffer surrounding the Hornsea Four array area.

## 12.8 Baseline environment

12.8.1.1 This section provides an overview of the oil and gas infrastructure, its associated activities and marine recreational activities within the study area.

### 12.8.2 Oil and Gas

12.8.2.1 The Infrastructure and Other Users study areas consist of several buffers depending upon the aspects of the topic being considered. The following study areas have been applied and are shown in [Figure 12.1](#):

- Study Area 1: Oil and gas operations: 1 km buffer which allows for the identification of oil and gas receptors which may have a physical overlap with Hornsea Four. This has been used to identify oil and gas licence blocks, subsea infrastructure, survey activity and offshore platforms. The buffer is based upon 500 m safety zones which are typically implemented around active oil and gas infrastructure and a potential 500 m around Hornsea Four infrastructure under construction and active maintenance. Study Area 2: Aviation Access: To help achieve a safe operating

environment, a consultation zone with a radius of 9 nm (16.67 km) exists around offshore helicopter destinations as suggested by the CAA (CAA, 2016). This consultation zone does not represent an area within which the development of Hornsea Four cannot occur but rather is intended as a trigger for consultation with offshore helicopter operators, the operators of existing installations and the holders of oil and gas exploration and development licences to help to ensure safe offshore helicopter operations. A 9 nm buffer has been applied around Hornsea Four array to inform consultation in relation to aviation safety. This buffer is not applicable to the ECC where infrastructure with the potential to affect the safety of helicopter operations will not be installed; and

- Study Area 3: REWS: a 35 km buffer surrounding the Hornsea Four array which is based upon the maximum range of the REWS located on oil and gas platforms and Closest Point of Approach (CPA) alarms.

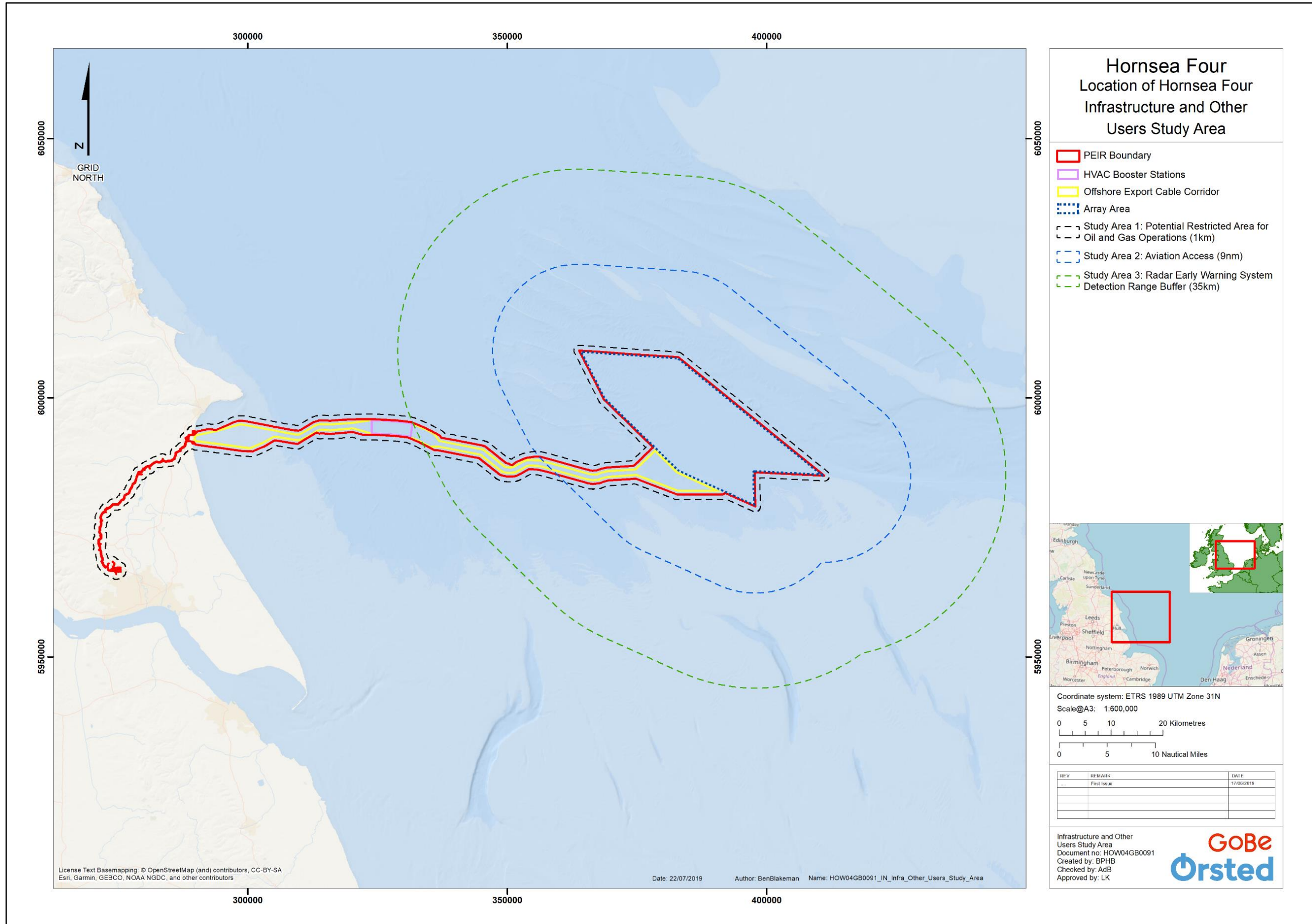


Figure 12.1: Oil and gas study areas (not to scale).

### 12.8.3 Existing baseline

- 12.8.3.1 Licences for the exploration and extraction of oil and gas on the UKCS have been offered since 1964 and are granted by the OGA. These licences are granted for identified geographical United Kingdom Hydrographic Office (UKHO) areas (blocks and sub-blocks) in consecutive rounds, with the most recent being the 30th licensing round (blocks offered May 2018); the 31<sup>st</sup> licensing round launched in July 2018 and closed on 7 November 2018. In June 2019, the Oil and Gas Authority offered for award 37 licence areas over 141 blocks or part-blocks to 30 companies in the 31<sup>st</sup> Offshore Licensing Round (OGA, 2019a). The 32<sup>nd</sup> offshore licensing round will be formally launched in summer 2019 and may include areas on offer in the North Sea and in the vicinity of Hornsea Four.
- 12.8.3.2 The main type of offshore licence is the Innovative Licence (OGA, 2019b). This is a new licence introduced by the OGA for the 29<sup>th</sup> licence round which replaces the traditional Seaward Production Licence. The Innovative Licence may cover the whole, or part of a specified block or a group of blocks and grants exclusive rights to the holders *'to search and bore for, and extract, petroleum'* (including gas) in the area covered by the licence. The initial term is variable, runs for a maximum of nine years, and is subdivided into three phases. Phase A is a period for carrying out geotechnical studies and geophysical data reprocessing; Phase B is a period for undertaking seismic surveys and acquiring other geophysical data; and Phase C is for drilling. There is a mandatory requirement to relinquish 50% of the licence block after the initial term. The second term is for field development and lasts four years and the third term, for production, is for 18 years. Longer terms may apply in certain areas. The traditional licence terms still apply to licences gained prior to the 29<sup>th</sup> licence round for which the initial term is four years, which can then be renewed for a further four years with a third term of 18 years. Exclusive rights may also include retained rights within an existing licenced acreage.
- 12.8.3.3 Other licences available for applicants include Production Licences and Exploration Licences.
- 12.8.3.4 **Table 12.4** and **Table 12.5** summarises the licence blocks located within or within 1 km of the Hornsea Four array area and offshore ECC, see **Figure 12.2**.
- 12.8.3.5 There are currently seven licenced blocks coinciding with the Hornsea Four array area and associated 1 km buffer, operated by Bridge Petroleum, Premier Oil, and Spirit Energy. There are eight unlicensed blocks coinciding with the Hornsea Four array.
- 12.8.3.6 There are currently nine licenced blocks coinciding with the Hornsea Four ECC and associated 1 km buffer, operated by Perenco, Premier Oil and Spirit Energy. There are currently 10 unlicensed blocks within the Hornsea Four ECC.

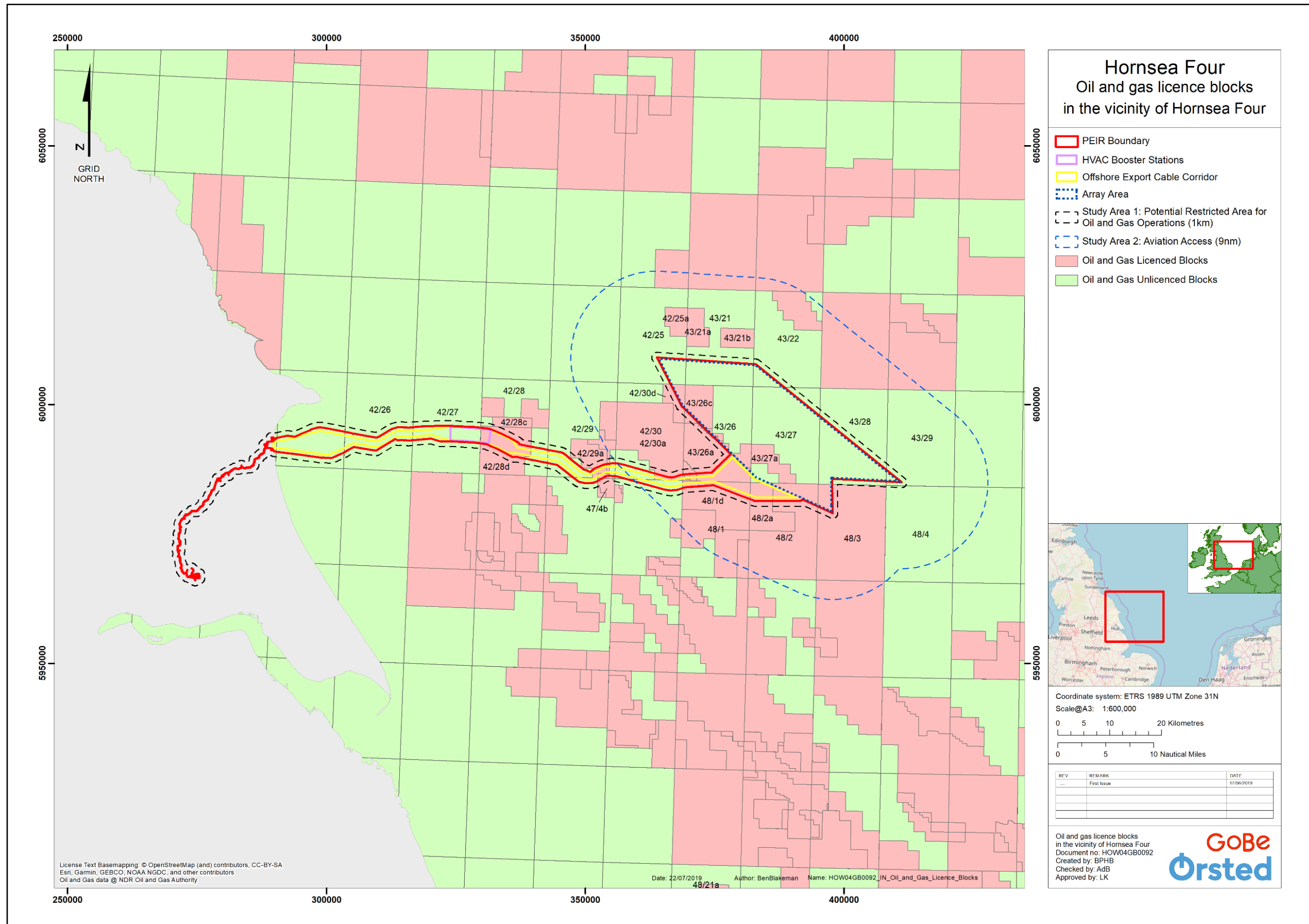


Figure 12.2: Oil and gas licence blocks in the vicinity of Hornsea Four (not to scale).



**Table 12.4: Current licenced blocks coinciding with the Hornsea Four array area and associated 1 km buffer.**

Block	Licence	Type	Licence End Date	Operator
42/30d	P2426	Production	30/09/2044 (Anticipated)	Bridge Petroleum
43/26c	P2426	Production	30/09/2044 (Anticipated)	
43/26a	P380	Production	N/A	Premier Oil/Perenco
43/27a	P686	Production	19/07/2025 (Anticipated)	Premier Oil
48/2a	P456	Production	N/A	Spirit Energy
48/2b	P2212	Production	30/11/2040 (Anticipated)	
48/3	P2290	Production	31/08/2041 (Anticipated)	

**Table 12.5: Current licenced blocks coinciding with the Hornsea Four ECC and HVAC booster station search area and associated 1 km buffer.**

Block	Licence	Type	Licence End Date	Operator
42/27a <sup>1</sup>	N/A	N/A	N/A	Dana Petroleum
42/28d	P1330	Production	21/12/2031	Premier Oil
42/29a	P1	Production	N/A	Perenco
42/30a	P1	Production	N/A	
47/4b	P302	Production	N/A	
48/1d <sup>2</sup>	P2336	Exploration	31/07/2049	
43/26a	P380	Production	N/A	Premier Oil /Perenco

<sup>1</sup> The licence for Block 42/27a has currently lapsed, however Dana are planning on re-applying for the licence in the next OGA Licencing Round in summer 2019.

<sup>2</sup> Licence block previously owned by BP, through pre-application consultation it has been identified that Perenco now operate BP's licences

Block	Licence	Type	Licence End Date	Operator
48/2a	P456	Production	N/A	Spirit Energy
48/2b	P2212	Production	30/11/2040	

## 12.8.4 Hydrocarbon Fields

12.8.4.1 Areas with hydrocarbon potential have been extensively explored, with many fields brought into production in the southern North Sea. There is a consensus view that the great majority of large fields in shelf depth waters (<200 m) have already been discovered (DECC, 2011a). However, with technological advances in seismic processing and drilling techniques there is still the potential for new discoveries. Owing to the geology of the southern North Sea, the hydrocarbon fields in the vicinity of Hornsea Four are gas or gas condensate fields rather than oil fields.

12.8.4.2 **Figure 12.3** presents the known gas fields that intersect with Hornsea Four and the associated 1 km buffer. There are three gas fields which coincide with the Hornsea Four array area, operated by Premier Oil, Spirit Energy and Perenco (**Table 12.6**).

12.8.4.3 There are five known gas fields within the ECC operated by Perenco and Premier Oil (**Table 12.7**).

**Table 12.6: Gas fields located within 1 km of the Hornsea Four array area.**

Field Name	Resource	Status	Discovery Date	Discovery Well	Production Date	Operator	Licence
Babbage	Gas	Producing	12/1998	48/02-02	08/2010	Spirit Energy	P456
Ravenspurn	Gas	Producing	11/1985	47/05a-4	04/19983	Perenco	P001
Johnston	Gas	Producing	04/1998	43/27-1	10/1994	Premier Oil	P686. P380
Tolmount	Gas	Consented	N/A	N/A	N/A	Premier Oil	P380

**Table 12.7: Hydrocarbon fields located within 1 km of Hornsea Four ECC and HVAC booster station search area.**

Field Name	Resource	Status	Discovery Date	Discovery Well	Production Date	Operator	Licence
Babbage	Gas	Producing	12/1998	48/02-02	08/2010	Premier Oil	P456
Ravenspurn	Gas	Producing	04/1983	42/30-22	10/1990	Perenco	P001
Ravenspurn South	Gas	Producing	04/1984	42/30-02	10/1990	Perenco	P001
Cleeton	Gas	Producing	04/1983	42/29-02	10/1988	Perenco	P001
Neptune	Gas	Producing	11/1985	47/05a-4	04/19983	Perenco	P001
Tolmount <sup>3</sup>	Gas	Consented	N/A	N/A	N/A	Premier Oil/Dana Petroleum	P380

12.8.4.4 Tolmount is a newly proposed gas field which is a considered one of the largest undeveloped gas fields in the North Sea. Its proposed development is considered critical to maximising economic recovery in the UKCS. The development plan aims to deliver gas to the UK by the end of 2020. (OGA, 2018) (Premier Oil, 2017).

12.8.4.5 Further information concerning drilling activity at the Tolmount field is detailed below in [Section 12.8.6](#).

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<sup>3</sup> The potential development of this field was discussed during pre-application consultation with oil and gas operators.

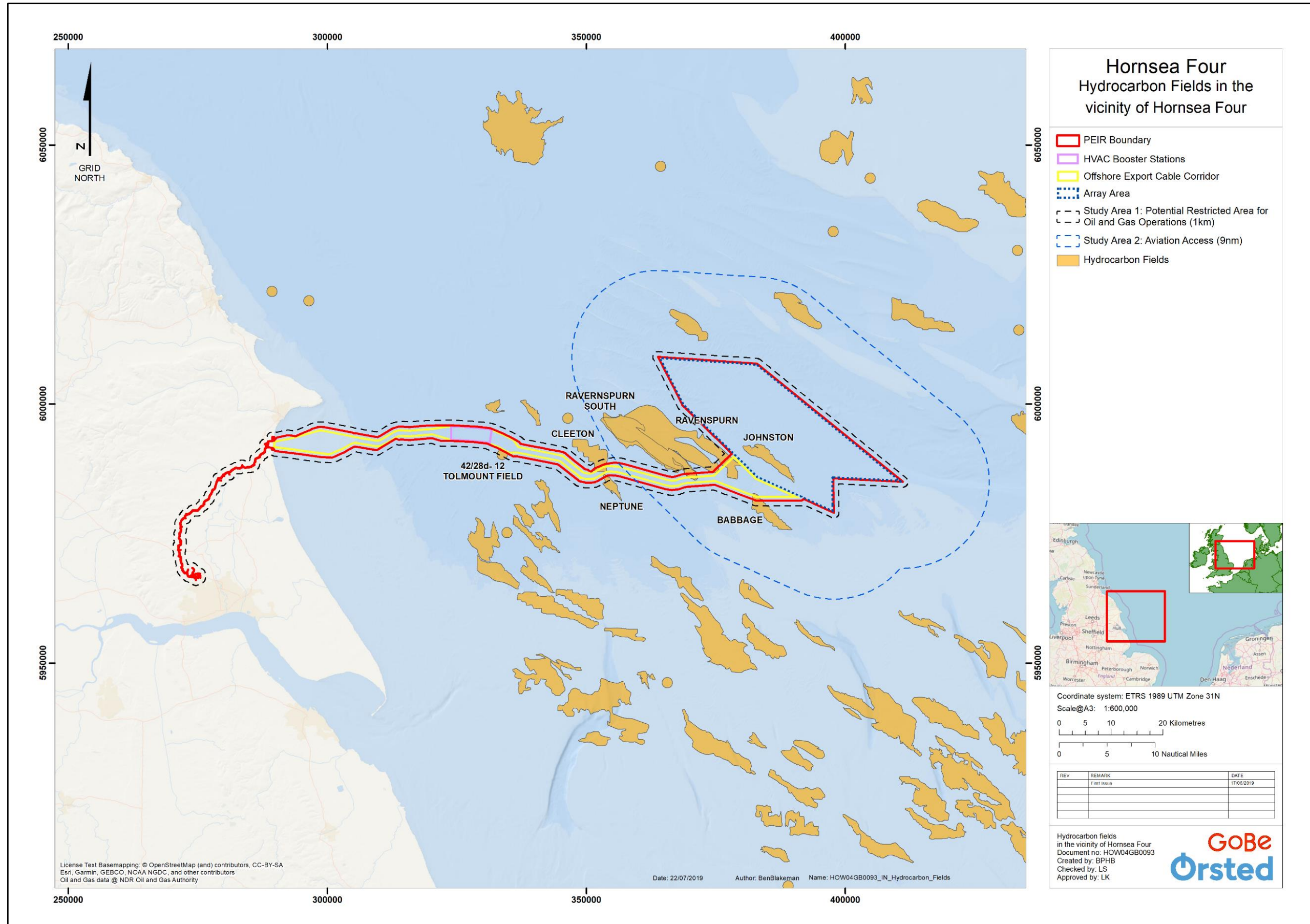


Figure 12.3: Hydrocarbon fields in the vicinity of Hornsea Four (not to scale).

## 12.8.5 Survey Activity

- 12.8.5.1 Seismic survey operations may be carried out by the oil and gas industry to identify sub-surface geological structures that might hold reserves of oil and gas. The technique involves releasing pulses of acoustic energy along designated survey lines with the energy penetrating the sub-surface rocks and being reflected to the surface where it can be detected by acoustic transducers and relayed to a recording vessel.
- 12.8.5.2 There is currently only one known planned geophysical survey that has the potential to occur during the construction phase of Hornsea Four; an application for consent has been made by Premier Oil to undertake a geophysical survey (sub-bottom profiler survey) in licence block 42/28d (see [Figure 12.2](#) for licence block location), which overlaps with the ECC (the planned surveys were confirmed by Premier Oil during consultation). The survey application is yet to be approved.
- 12.8.5.3 Although no other applications for seismic or geophysical survey by the oil and gas industry are currently registered, it was made clear during consultation with the oil and gas operators with interests near Hornsea Four that future surveys will be required. For example, Gassco identified that ongoing multi-beam echo-sounder surveys will be required in relation to maintenance of the Langeled South pipeline. This is also the case for ConocoPhillips who have ongoing survey requirements on the CMS Trunkline. Dana Petroleum also highlighted the potential need for geophysical and geotechnical surveys in 2020 to support well planning for Licence Block 42/27a (which has currently lapsed but for which they intend to re-apply).
- 12.8.5.4 It is recognised that further surveys may be planned during the development phase of Hornsea Four and consultation with relevant licence block holders will be ongoing to identify potential seismic survey activity.

## 12.8.6 Surface Structures

- 12.8.6.1 Oil and gas surface structures include permanent infrastructure such as gas platforms, as well as temporary structure such as drilling rigs and vessels. There is a total of 10 permanent platforms within the 9 nm (16.67 km) aviation access buffer (recommended by the CAA as the potential impact area for safe helicopter operations) surrounding the Hornsea Four array boundary, but none within 1 km of the array area. There are three platforms which are within 1 km of the ECC. These are summarised in [Table 12.8](#) and shown in [Figure 12.4](#).
- 12.8.6.2 Details on those platforms which have a REWS will be sought through further consultation with oil and gas stakeholders and will be provided in the final application, further detail is provided below in [Section 12.8.10](#).

**Table 12.8: Oil and gas platforms located within 9 nm (16.67 km) the of Hornsea Four array, and within 1 km of the ECC, and HVAC booster station search area.**

Platform Name	Operator	Status	Distance to the Hornsea Four Array Boundary	Distance to the Hornsea Four ECC boundary	Distance to the Hornsea Four HVAC Booster Station Search Area
Babbage	Spirit Energy	Active	4.31 km (2.33 nm)	0.42 km (0.23 nm)	52.87 km (23.55 nm)
Kilmar NUI	Alpha Petroleum	Active	12.69 km (6.85 nm)	29.86 km (16.12 nm)	63.56 km (34.32 nm)
Garrow NUI	Alpha Petroleum	Active	6.96 km (3.76 nm)	26.73 km (14.43 nm)	42.76 km (23.09 nm)
Ravenspurn North CC	Perenco	Active	3.06 km (1.65 nm)	0.42 km (0.23 nm)	44.14 km (23.83 nm)
Ravenspurn North CCW	Perenco	Active	2.94 km (1.59 nm)	0.39 km (0.21 nm)	44.22 km (23.88 nm)
Ravenspurn North ST2	Perenco	Active	4.16 km (2.25 nm)	4.65 km (2.51 nm)	39.47 km (21.31 nm)
Ravenspurn North ST3	Perenco	Active	7.95 km (4.29 nm)	6.69 km (3.61 nm)	31.55 km (17.04 nm)
Ravenspurn South A	Perenco	Active	9.25 km (4.99 nm)	2.69 km (1.45 nm)	35.33 km (19.08 nm)
Ravenspurn South B	Perenco	Active	9.69 km (5.23 nm)	5.02 km (2.71 nm)	30.65 km (16.55 nm)
Ravenspurn South C	Perenco	Active	11.95 km (6.45 nm)	6.42 km (3.47 nm)	25.69 km (13.87 nm)

12.8.6.3 During the informal consultation completed to date, various oil and gas operators informed the Applicant of various planned works which are at varying stages of the consent process. These are detailed in [Table 12.9](#).

**Table 12.9: Proposed future developments near Hornsea Four.**

Operator	Status	Location	Consultation
Dana Petroleum	Proposed application in next OGA Licencing Round Summer 2019	Block 42/27a (overlaps with the ECC)	The licence for Block 42/27a has currently lapsed, however Dana are planning on re-applying, with exploration drilling in the block planned to take place sometime in 2020.
Dana Petroleum	Host Selection Phase	Block 48/1a which is located approximately 4.1 km from the easterly end of the ECC	Platypus Project which is expected to involve development drilling, pipeline installation and the installation of a small NUI. The projected field life of Platypus is 16 years with installation of the platform expected to commence in Q2 2021 and drilling to commence in Q3 2021. It is likely that the platform will be constructed, and drilling would have commenced prior to the beginning of construction of Hornsea Four.
Bridge Petroleum Limited	Development Concept Phase	The exact drilling location is unknown at present and will be decided in summer 2019, although it is expected to be located within Block 42/30d which overlaps with the west of the array area.	Plan to drill up to three wells within the known filed Kumatage and reservoir. The field has an estimated life of seven years. They are currently in the Development Concept Phase and no concrete plans or timelines have been put in place as of yet. The production concept will either take the form of a subsea wellhead or a NUI. A platform is expected to be the chosen outcome (either mooring or hybrid), likely located in Block 42/30d.
Premier Oil	Consented and development underway.	Block 42/28d, located within to the proposed ECC.	The development will consist of main platform (Tolmount Main) and three upcoming wells (Tolmount East Appraisal Well, Tolmount Far East Well and Tolmount Main – South Infill Well). Construction of this platform is expected to occur in May 2020 so will be operational, if built, during Hornsea Four construction phase and during the operational phase
Speedwell Energy	No formal plans	Block 43/21b, 1.8 km to the north of the array area.	Indicated the possible development of a platform

12.8.6.4 In addition, several the operators consulted have indicated that a number of platforms and associated infrastructure within the southern North Sea are scheduled to be decommissioned in the near future. Alpha Petroleum, the owner of Garrow and Kilmar, expect decommissioning activities at these two platforms to occur in 2024. Perenco are currently undertaking various decommissioning programmes in the southern North Sea, with a plan to remove approximately 1-2 jackets per year.

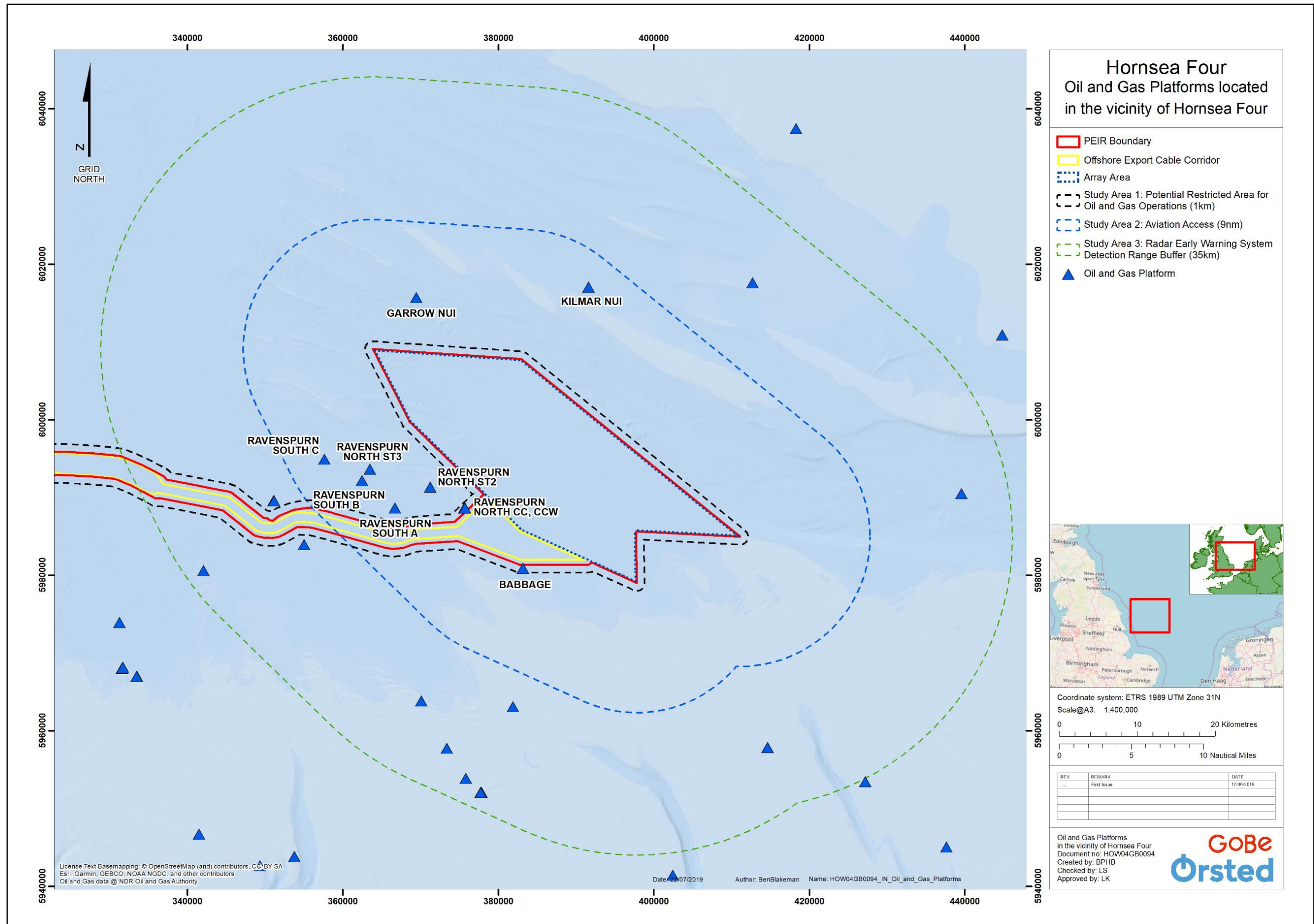


Figure 12.4: Platforms located in the vicinity of Hornsea Four (not to scale).



## 12.8.7 Subsurface Structures

12.8.7.1 Subsurface structures (excluding wells, see below in [Section 12.8.8](#) for further detail) include:

- Protective structures – These structures can be fully enclosed structure which can provide a suspended subsea wellhead protection from dropped objects and to help deflect fishing activity;
- Manifolds – A subsea manifold is a large metal piece of equipment, made up of pipes and valves and designed to transfer oil / gas from wellheads into a pipeline;
- Wellheads – When a well is drilled the structure placed on the seabed is called a wellhead. There may be a single wellhead, though often there may be several units grouped together to form a block. Attached to the top of the wellhead are the control units called subsea trees; and
- Trees and valves – Subsea trees are structures attached to the top of subsea wells to control the flow of oil / gas to or from a well. When attached to a subsea well the combined structures can extend to 7 m above the seabed in height.

12.8.7.2 These subsurface structures (excluding wells) may be protected by a 500 m safety zone as applied for and implemented by the operator. Subsurface structures are shown in [Figure 12.5](#).

12.8.7.3 There is one active manifold and an active wellhead located in the Johnston field, which is within the Hornsea Four array area, operated by Premier Oil. Premier Oil are expected to decommission their subsea Johnston infrastructure; although there is currently no confirmed timescales it is expected that this will occur between 2019 – 2021 (Premier Oil, 2016).

12.8.7.4 There are no active subsurface structures within the Hornsea Four ECC. However, there are two active subsurface protection structures within 1 km of ECC, which are now operated by Perenco who took over the former BP assets. There is also a single wellhead within 1 km of the ECC associated with the Tolmount field, operated by Premier Oil, which is currently not in use.

## 12.8.8 Wells

12.8.8.1 This section provides an overview of wells within the 1 km study area.

12.8.8.2 Wells can be classified as follows:

- **Exploration well:** drilled as part of an exploration programme for information gathering purposes, to determine the presence of oil/gas;
- **Appraisal well:** drilled as part of an appraisal drilling programme which is carried out to determine the physical extent of reserves and the likely production rate of a field;
- **Production well:** intended to produce gas from an already appraised field or reserve; or
- **Development well:** drilled within a proven production field or area of an oil or gas reservoir, to the depth of a stratigraphic horizon known to be productive.

12.8.8.3 The completion status of wells, as defined by the OGA Well Operations Notification System (OGA, 2018b) is described below:

- A constructed well or wellbore that is neither operational nor fully abandoned is assigned one of four, temporary physical (mechanical) status classifications:
  - **Completed (Shut-in):** A completed wellbore that is shut in either at the tree valves or subsurface safety valve. Normally this status will only be applied if the wellbore is intended to be shut in for 90 days or more;
  - **Plugged:** A wellbore that has been plugged with a plug rather than an abandonment barrier;
  - **AB1:** The reservoir has been permanently isolated. The wellbore below the barrier is no longer accessible; and
  - **AB2:** All intermediate zones with flow potential have been permanently isolated. The wellbore below the barrier is no longer accessible.
- A development well is categorised as “inactive” when the field permanently ceases production;
- A subsea development well, with no further use, and not connected to an installation is categorised as “inactive”;
- An exploration or appraisal well, without an active rig working on it and after any well test is completed is categorised as “inactive”;
- A well that has had an abandonment notice served by OGA is categorised as “inactive”; and
- **AB3** - A fully abandoned well means the well origin at the surface has been removed and the well origin will never be used again.

12.8.8.4 Completed and drilling wells typically have a 500 m safety zone (Step Change in Safety, 2017). Suspended, and plugged and abandoned wells do not have safety zones.

12.8.8.5 There are 29 wells located within a 1 km buffer the Hornsea Four array area of which:

- Nine are categorised as AB1;
- Nine are categorised as AB3;
- Eight are completed and operating; and
- Three are categorised as completed (shut in).

12.8.8.6 There are 40 wells located within 1 km of the PEIR area for the ECC of which:

- 11 are categorised as AB1;
- Nine are categorised as AB3;
- 13 are completed and operating; and
- Seven are categorised as completed (shut in).

12.8.8.7 As detailed in [paragraph 12.8.6.3](#) during the pre-application consultation, certain oil and gas operators indicated that they had future plans to drill further wells within or in the vicinity of Hornsea Four or to re-enter old wells in some licence blocks. The likely key

known developments that were noted in oil and gas consultation are detailed below in [Table 12.9](#):

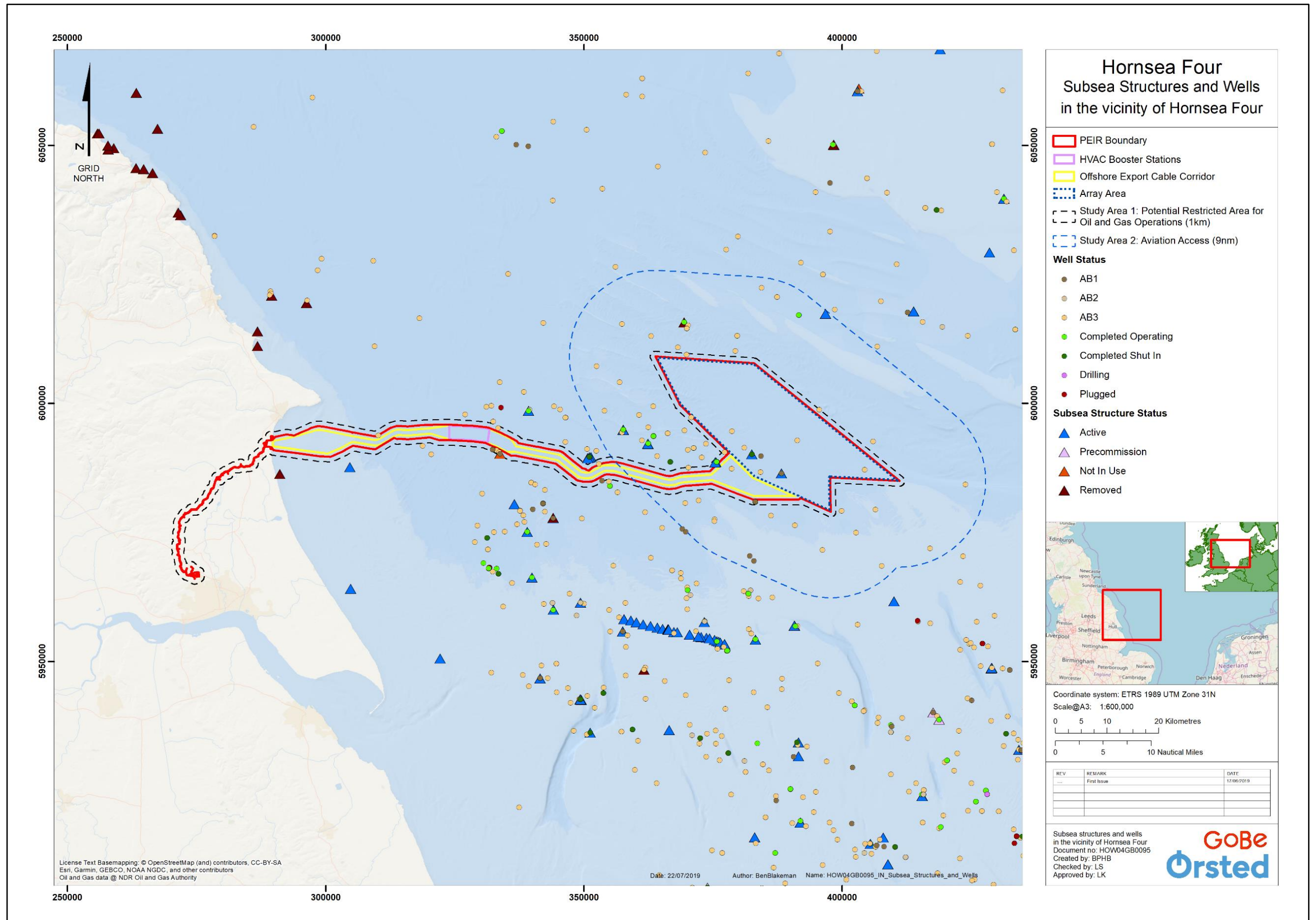


Figure 12.5: Subsea structures and wells in the vicinity of Hornsea Four (not to scale). Well status definitions are provided in paragraph 12.8.8.3 above.

## 12.8.9 Oil and Gas Operations: Shipping and Navigation

12.8.9.1 A variety of vessels are required to service or support oil and gas operations. They can include:

- Offshore support vessels such as platform supply vessels which routinely operate within the 500 m exclusion zones of offshore facilities bringing supplies and equipment and removing waste;
- Larger specialist vessels such as drilling rigs, crane barges and accommodation facilities which may be stationed adjacent to platforms or over subsea wells/infrastructure in order to drill, re-enter or abandon wells, undertake construction or decommissioning activity and provide accommodation for personnel undertaking significant construction, maintenance or decommissioning campaigns; and
- Supporting vessels such as tugs and anchor handlers, emergency response and recovery vessels etc.

12.8.9.2 Vessel visits may be planned (e.g. in order to change crews or carry out pre-planned work) or may be unplanned (i.e. arranged at short notice in order to respond to a problem/emergency).

12.8.9.3 Vessels do not have specified routes and do not always originate directly from shore. Routes can be via other platforms first. Nonetheless, the most commonly used vessel routes (as defined by Automatic Information System (AIS) data) including use by oil and gas vessels, are described in [Volume 2, Chapter 8: Shipping and Navigation](#).

## 12.8.10 Oil and Gas Platforms: Radar Early Warning Systems

12.8.10.1 Early warning systems are used to prevent vessel collision with an offshore oil and gas platform, including REWS. This system utilises radar mounted on the platform to detect and track vessels and provide collision warning when vessels are in breach of defined CPA and Time to Closest Point to Approach (TCPA) parameters. When they reach a certain threshold, an alarm is triggered. This value is set in accordance with the platform operator's own performance standards and typically consists of an amber alert and a red alarm indicating when vessel intervention or emergency procedure are required. The REWS radar does not work in isolation, but together with other radar and AIS data provides a field wide collision risk management system which protects the whole field. The REWS on one platform (and sometimes combined with the REWS on another platform) therefore protects a range of platforms. Typically, the detection limit for a 100 m<sup>2</sup> radar cross section target vessel is 30 km (16 nm). However, this may vary depending on factors such as weather conditions.

12.8.10.2 The locations of REWS on oil and gas platforms will be confirmed during ongoing consultation with oil and gas operators and will be characterised within the submission of the final ES application.

## 12.8.11 Oil and Gas Operations: Aviation

12.8.11.1 The majority of the manned and unmanned platforms will be accessed using helicopters, particularly for crew transfers. The safety of helicopters approaching platforms is governed by operating procedures which can be affected by the presence of wind turbines. Therefore, Hornsea Four has the potential to affect the helicopter operations at a number of the adjacent platforms, with Ravenspurn North and Babbage likely to be the key platforms in this regard of concern. In addition, helicopters may follow Helicopter Main Routes (HMRs) when transiting to or between platforms. Further information on HMRs and helicopter platform access is provided in [Volume 2, Chapter 9: Aviation and Radar](#).

12.8.11.2 As part of the consultation with oil and gas operators completed to date, information on helicopter operations at a number of platforms has been provided and is summarised in [Table 12.10](#).

**Table 12.10: Operators in the vicinity of Hornsea Four helicopter operations as provided in pre-application consultation.**

Operator	Name of Platform	Helicopter operations
Alpha Petroleum	Kilmar and Garrow	35 visits a year to each platform (70 in total) (operating from Norwich either direct or via other adjacent platforms such as Ravenspurn North and West Sole Alpha).
Perenco	Ravenspurn North Hub	Around five helicopter visits per week (260 per year).
Spirit Energy	Babbage platform	Now operating from Humberside (with potential further alterations to the flight path in the future), flights are usually direct, although occasionally will "piggy-back" off other flights in the region. The platform is usually manned for a minimum of 8-12 days and require helicopter access for crew changes. When unmanned, access will be required in case of an emergency..

## 12.8.12 Marine Recreational Activities

12.8.12.1 This section provides an overview of recreational activities that occur within the marine environment in the vicinity of the Hornsea Four.

12.8.12.2 This baseline description focuses primarily on the activity occurring in the inshore and coastal areas and in the vicinity of the export cable corridor and landfall (and within approximately 12nm of the coast) where the majority of activity occurs. It is acknowledged that there are a number of activities which take place in the areas further offshore (beyond approximately 12 nm), including in the array and the offshore sections of the ECC, but, given the distance of the array area from shore (approximately 65 km/ 35 nm at its closest point), it is considered that the level of activity will be significantly lower than in the inshore and coastal areas. [Figure 12.6](#) provides an overview of the recreational activity that take place in the vicinity of Hornsea Four.

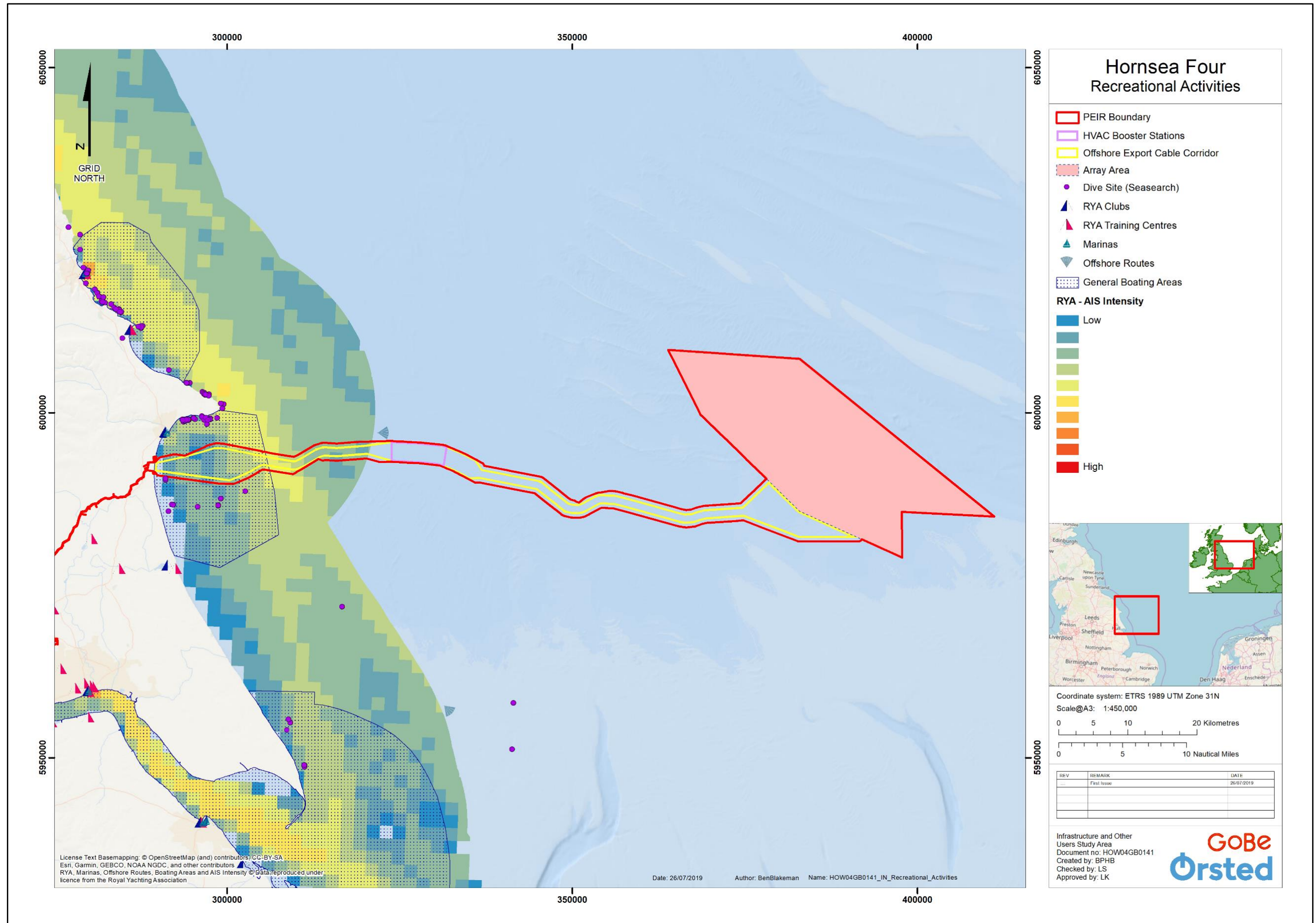


Figure 12.6: Recreational activities in the vicinity of the Hornsea Four (not to scale).

## Offshore Areas

### *Recreational Sailing*

- 12.8.12.3 Recreational sailing and motor cruising will be considered in the Navigational Risk Assessment (NRA) (in the ES) and is considered in [Volume 2, Chapter 8: Shipping and Navigation](#) of this PEIR. This chapter considers receptors undertaking recreational sailing and motor cruising as an activity only, i.e. not from a safety perspective.
- 12.8.12.4 Recreational sailing is generally divided into two categories: offshore and inshore. Offshore sailing is usually undertaken by yachts in the form of either cruising or organised offshore racing. Inshore sailing is typically undertaken by smaller vessels including dinghies and recreational vessels that are used for either cruising at leisure or racing. Cruising may include day trips between local ports and often includes a return journey to the home port on the same day. Inshore racing takes place around racing marks and navigational buoyage.
- 12.8.12.5 Recreational sailing usually takes place in the vicinity of established sailing clubs. However, boats can also be launched and sailed wherever access to launch is permitted and therefore the activity is not always associated with a specific club.
- 12.8.12.6 Due to the distance of the Hornsea Four array area from the UK coast (approximately 65 km/35 nm at its nearest point), any sailing would be likely to only consist of occasional offshore cruising and racing. The Royal Yachting Association (RYA) atlas of recreational boating does not identify any recreational routes in the vicinity of the Hornsea Four array area. This does not preclude the presence of cruising or racing within the Hornsea Four array area but does indicate that the overall usage is low (and occasional).
- 12.8.12.7 The winter maritime traffic surveys carried out in January/February 2019 to inform the NRA (see in [Volume 2, Chapter 8: Shipping and Navigation](#)) recorded one recreational vessel tracks passing through the Hornsea Four array area. It is anticipated that a higher number of recreational vessels will be recorded in the summer traffic surveys due to the seasonal nature of the activity.

### *Diving and Water Sports*

- 12.8.12.8 The Holderness coastal area has a high concentration of shipwrecks, many from the First and Second World Wars (see [Volume 2, Chapter 10: Archaeology](#)). This is mainly due to the fact that the Yorkshire coast is bordered by large ports on both the Tees and Humber estuaries. These wrecks, in addition to the marine habitats present along the coast (including areas of cobble, pebble and rock boulders) support a wide variety of marine life and provide areas of interest for divers.
- 12.8.12.9 There are several wrecks within the offshore study area (see [Volume 2, Chapter 10: Archaeology](#)) some of which are visited by diving charter vessels. Diving activity occurs from local ports (such as Bridlington and ports in the Humber Estuary) ([Figure 12.6](#)).



12.8.12.10 Kite surfing, surfing and wind surfing all occur almost entirely in coastal waters, usually within 1 nm of the shore.

12.8.12.11 There is no physical restriction on the offshore range of kayaks and canoes however for logistical and safety reasons most stay relatively close to the shore, undertaking coastal rather than seaward trips.

12.8.12.12 These water sport activities are run and fed from local towns and communities (i.e. these are of local interest serve local demand and so represent receptors of local value). It is considered that there is availability of alternative sites for these activities in the immediate area but at sufficient distance from the proposed works to avoid an impact.

### *Angling*

12.8.12.13 Recreational angling (i.e. for pleasure rather than commercial reasons) is not common in offshore areas. Most charter vessels fishing the area are only licensed to transport passengers up to 20 miles (17.4 nm) from land (UK Charter Boats 2012). Therefore, there is a very limited level of recreational angling activity which takes place in the offshore waters of the offshore study area.

### *Wildlife Boat Trips*

12.8.12.14 Wildlife tours in offshore areas are also rare given the distance from coastal ports. As such there is limited level of wildlife tour activity which takes place in the offshore waters of the offshore study area.

### *Inshore and Coastal Areas*

#### *Recreational Sailing*

12.8.12.15 The East Anglia and Humber coasts are recognised as popular UK sailing areas with several RYA clubs and marinas (DECC, 2009). There are a number of sailing clubs along the Yorkshire coastline. There is low to medium recreational vessel activity in the nearshore area of the Hornsea Four offshore cable corridor, with a number of offshore routes fanning out from the coastal area which are likely to intersect the Hornsea Four ECC. The Hornsea Four ECC also crosses a general boating area, which runs parallel to the coast ([Figure 12.6](#)).

#### *Diving and Water Sports*

12.8.12.16 As an example of a local business engaged in recreational diving activity, 'Boat Hire and Charter' operate two diving charter vessels from Bridlington Harbour that offer trips to over 100 dive sites including wrecks in waters between 15 m and 60 m deep ([Figure 12.6](#)). Any of the large number of wrecks in the area may also be popular with local and visiting dive clubs.

12.8.12.17 The inshore and coastal areas are used for a variety of other recreational water sports, including kite surfing, wind surfing and surfing. However, areas further north (to the north of Flamborough Head) and further south are considered to be more suitable for these

activities, particularly surfing (Surfers Against Sewage, 2009). Popular surfing locations in the north-east of England include the areas around Tynemouth, South Shields, Hartlepool, Saltburn, Whitby and Scarborough.

12.8.12.18 Kayaking and canoeing have the potential to occur within the nearshore and inshore sections of the Hornsea Four offshore cable corridor.

#### *Angling*

12.8.12.19 Recreational angling in Bridlington Bay and the wider Holderness coast is popular, with both shore-based sea fishing carried out from the beaches, piers and jetties, as well as boat-based fishing. The high concentration of shipwrecks in the area (see above) makes it a popular area for recreational fishing, as a result of the aggregations of fish which can occur at these sites.

12.8.12.20 Recreational charter vessels primarily operate out of Bridlington Harbour, approximately 3.5 km from the export cable corridor. Twelve vessels are available for charter out of Bridlington Harbour. The majority of these are 40 ft vessels capable of carrying up to 12 anglers, offering four to 12-hour trips for wreck and reef fishing up to 60 miles from Bridlington. In addition to the charter fleet, there are in the region of 90 boats that regularly go rod and line fishing. These privately-owned boats are based either in Bridlington Harbour or at the two boat compounds along the south shore at Bridlington. Key target species for recreational boat-based anglers are cod, whiting, dab, plaice, mackerel, bass, pollock, rays, smoothhound and tope. Hornsea, Mappleton and Skipsea areas are also popular for whiting fishing.

12.8.12.21 Shore angling is very popular throughout the wider coastal region of Holderness. Regular fishing matches take place including Europe's largest shore angling competition, the European Open Beach Championship, which is based at Bridlington and held annually. Other high profile matches include the Daiwa Open and the Warrior Open which in previous years have each attracted over 1,000 competitors.

12.8.12.22 Key species targeted from the beach include cod, whiting, dab, flounder, bass, rays and smoothhound.

#### *Wildlife Boat Trips*

12.8.12.23 To the north of the cable landfall is Flamborough Head which is an area protected for its seabird colonies (see the Hornsea Four Report to Inform Appropriate Assessment). As a result of the ornithological interests in the area, tourist boats offer day trips to view the scenic coastline and bird colonies, primarily in the summer months. Of most relevance to the proposed development are the Royal Society for the Protection of Birds (RSPB) seabird cruises on the MV Yorkshire Belle, which operates from Bridlington Harbour (April to October) and is licenced for up to 210 passengers and can also be hired for events.

### **12.8.13 Predicted future baseline**

12.8.13.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 requires that "an outline of the likely evolution thereof without implementation of the

development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge” is included within the Environmental Statement.

- 12.8.13.2 In the event that Hornsea Four does not proceed, an assessment of the future baseline conditions has been carried out and is described within this section.
- 12.8.13.3 In the 2019 Oil and Gas UK Business Outlook Report (Oil and Gas UK, 2019), it is noted that gas production (which is the resource exploited in the vicinity of Hornsea Four) has decreased around 3% compared to 2017 as a result of lower than expected performance within key gas hubs and the lack of new gas fields being explored. However, it is anticipated that there could be increases in both oil and gas production during the year.
- 12.8.13.4 In 2018, only 102 wells were drilled in the UKCS; 85 of which consisted of development well drilling. A further eight wells were drilled for exploration along with eight appraisal wells. The oil and gas forecast for 2019 predicts an increase in all drilling activity.
- 12.8.13.5 In the North Sea, many older fields and assets are being decommissioned or will be decommissioned in the coming years. For example, 203 fields in UK waters are to undergo decommissioning activity over next decade, 2379 wells are expected to be decommissioned in the North Sea over the next ten years, over 950,000 tonnes of topsides are forecast to be removed across the North Sea, and 5,724 km of pipelines in UK waters are slated for decommissioning by 2027 (Oil and Gas UK, 2018).

#### **12.8.14 Data Limitations**

- 12.8.14.1 The data sources used in this chapter are detailed in [Table 12.3](#) above. The data used is the most up to date publicly available information supported by information provided by relevant operators during consultation as detailed in [Section 12.5](#) above. Consultation with oil and gas stakeholders has provided the most up-to-date information. Where consultation has not been undertaken or has been limited, desk-based information has been used which will require confirmation through further consultation with relevant operators.
- 12.8.14.2 It is considered that the data employed is of a robust nature and sufficient for the purposes of describing the baseline of the oil and gas activity in the vicinity of Hornsea Four.

#### **12.8.15 Impact register and impacts “scoped out”**

- 12.8.15.1 Based on the baseline environment, the project description outlined in [Volume 1: Chapter 4, Project Description](#) and the embedded mitigation measures in [Volume 4: Annex 5.2, Commitments Register](#), several impacts have been “scoped out” of the PEIR assessment for Infrastructure and Other Users. These impacts are summarised in [Table 12.11](#), together with a justification for scoping out. Further detail is provided in [Volume 4: Annex 5.1 Impacts Register](#).
- 12.8.15.2 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).

12.8.15.3 Note that the Scoping Opinion provided by the SoS confirmed that the potential impacts on the following receptors should be scoped out of any further consideration in the EIA process (PINS, 2018):

- Offshore telecommunications cables;
- Other offshore wind farms;
- Existing and proposed cables and pipelines;
- Ministry of Defence (MOD) Practice and Exercise Areas (PEXAs);
- Carbon capture and storage and natural gas storage;
- Disposal sites; and
- Aggregate extraction.

**Table 12.11: Infrastructure and Other Users impact register.**

Project activity and impact	Likely Significance of Effect	Approach to Assessment	Justification
Aggregate dredging activities. (Construction, Operation and Maintenance and Decommissioning) (IOU-AP-1)	No likely significant effect	Scoped Out	Given that there are no licensed aggregate dredging sites within 30+km of the Hornsea Four array area or offshore ECC, impacts on aggregate dredging activity will be scoped out of any further consideration in the EIA process.
Disposal sites (Construction, Operation and Maintenance and Decommissioning) (IOU-AP-2)	No likely significant effect	Scoped Out	As there are no active, licensed sites within or within 2 km of the Hornsea Four array area (excluding the adjacent Hornsea One and Two sites) or offshore ECC, and significant effects are unlikely to occur at any phase of the project development on licensed disposal sites the receptor will be scoped out of any further consideration in the EIA process.
Impacts on the proposed Endurance CCS Site (Construction, Operation and Maintenance and Decommissioning) (IOU-AP-3)	No likely significant effect	Scoped Out	Given the current status of the CCS projects in the UK (and the planning refusal of the White Rose CCS project), impacts on the Endurance CCS site will be scoped out of any further consideration in the EIA process.
Temporary loss of access to existing or proposed pipelines or cables for repair or maintenance. (Construction, Operation and Maintenance and Decommissioning) (IOU-AP-4)	No likely significant effect	Scoped Out	The suggested embedded mitigation, including crossing and proximity agreements with known existing pipeline and cables operators, will ensure access for cable or pipeline repair and maintenance, and as such does not need to be considered any further in the assessment.

Project activity and impact	Likely Significance of Effect	Approach to Assessment	Justification
Displacement of recreational craft and recreational fishing vessels resulting in a loss of recreational resource (Construction, Operation and Maintenance and Decommissioning) (IOU-AP-5)	No likely significant effect	Scoped Out	Due to the relatively limited recreational activity in the nearshore and offshore areas in the vicinity of Hornsea Four and the temporal and spatial nature of the works propose din the ECC, no likely significant effects are expected to occur on marine recreational users and will be scoped out of any further consideration in the EIA process.

**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.

12.8.15.4 A consideration of marine recreational activity was not included within the Scoping process. However, consideration of the potential impacts on marine recreational activity are included in this chapter. Having reviewed the marine recreational activity baseline presented herein, the Applicant considers that there will be no significant impacts on recreational activity and have therefore scoped out further consideration of impacts on marine recreational receptors from the Infrastructure and Other Users PEIR chapter assessment. Justification to support the scoping out of these impacts is provided in Volume 4, Annex 5.1: Impacts Register and detailed below in [Table 12.11](#).

12.8.15.5 To support this scoping out process, a brief description of the baseline of marine recreational activity is, however, provided in [Section 12.8.12](#).

**12.8.16 Commitments**

12.8.16.1 The Applicant has made 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 also embedded as an inherent aspect of the EIA process. Full details of commitments are included within the [Volume 4, Annex 5.2: Commitments Register](#).

12.8.16.2 The commitments adopted by the Applicant in relation to Infrastructure and Other Users are presented in [Table 12.12](#).

**Table 12.12: Relevant Hornsea Four commitments to infrastructure and other users.**

Commitment ID	Measure Proposed	How the Measure will be Secured
Co57	Tertiary: Where offshore export cables must cross third party infrastructure, such as existing cables and pipelines, both the third-party asset and the installed cables will be protected.	Crossing Agreements

Commitment ID	Measure Proposed	How the Measure will be Secured
Co81	Tertiary: Where scour protection is required, MGN 543 (or latest relevant available guidance) will be adhered to with respect to changes greater than 5% to the under keel clearance.	DCO Schedule 11, Part 2 - Condition 14 and; DCO Schedule 12, Part 2 - Condition 14 <i>(Offshore safety management)</i>
Co89	Tertiary: Advance warning and accurate location details of construction, maintenance and decommissioning operations, associated Safety Zones and advisory passing distances will be given via Notice to Mariners and Kingfisher Bulletins.	DCO Schedule 11, Part 2 - Condition 6(8) and; DCO Schedule 12, Part 2 - Condition 8(8) <i>(Notifications and inspections)</i>
Co93	Tertiary: Aids to navigation (marking and lighting) will be deployed in accordance with the latest relevant available standard industry guidance and as advised by Trinity House, MCA and Civil Aviation Authority (CAA) and MoD as appropriate. This will include a buoyed construction area around the array area and the HVAC booster station in consultation with Trinity House.	DCO Schedule 11, Part 2 - Condition 7 and; DCO Schedule 12, Part 2 - Condition 7 <i>(Aids to navigation)</i>  DCO Schedule 11, Part 2 - Condition 12(1)(j) and; DCO Schedule 12, Part 2 - Condition 14(1)(j) <i>(Aid to navigation management plan)</i>
Co94	Tertiary: The United Kingdom Hydrographic Office will be notified of both the commencement (within two weeks), progress and completion of offshore construction works (within two weeks) to allow marking of all installed infrastructure on nautical charts.	DCO Schedule 11, Part 2 - Condition 6(10) and; DCO Schedule 12, Part 2 - Condition 6(10) <i>(Notifications and inspections)</i>
Co96	Tertiary: The project commits to agreeing layout principles with MCA, which will include maintaining at least one line of symmetry/ orientation in turbine layout.	DCO Schedule 11, Part 2 - Condition 12(1)(a) and; DCO Schedule 12, Part 2 - Condition 12(1)(a) <i>(Pre-construction plans and documentation)</i>
Co98	Tertiary: Monitoring of vessel traffic for the duration of the construction period.	DCO Schedule 11, Part 2 - Condition 17(2)(b) and; DCO Schedule 12, Part 2 - Condition 17(2) <i>(Construction Monitoring)</i>

Commitment ID	Measure Proposed	How the Measure will be Secured
Co99	Tertiary: Hornsea Four will ensure compliance with MGN543 where appropriate.	DCO Schedule 11, Part 2 - Condition 14 and; DCO Schedule 12, Part 2 - Condition 14 <i>(Offshore safety management)</i>
Co102	Tertiary: The Defence Geographic Organisation will be informed of the locations, heights and lighting status of the wind turbines, including estimated and actual dates of construction and the maximum height of any construction equipment to be used, prior to the start of construction, to allow inclusion on Aviation Charts.	DCO Schedule 11, Part 2 - Condition 6 and; DCO Schedule 12, Part 2 - Condition 6 <i>(Notifications and Inspections)</i>
Co107	Tertiary: Crossing and proximity agreements with known existing pipeline and cables operators will be sought.	Secured by commercial agreements with pipeline and cable operators.
Co108	Tertiary: A Vessel Management Plan (VMP) will be developed pre-construction which will determine vessel routing to and from construction areas and ports to minimise encounters with marine mammals.	DCO Schedule 11, Part 2 - Condition 12(1)(d)(v) and; DCO Schedule 12, Part 2 - Condition 12(1)(d)(v) <i>(Vessel management plan)</i>
Co139	Secondary: Safety zones of up to 500m will be applied during construction, maintenance and decommissioning phases. Where appropriate, guard vessels will also be used to ensure adherence with Safety Zones or advisory passing distances, as defined by risk assessment, to mitigate any impact which poses a risk to surface navigation during construction, maintenance and decommissioning phases. Such impacts may include partially installed structures or cables, extinguished navigation lights or other unmarked hazards.	Application for safety zones to be made post consent under 'The Electricity (Offshore Generating Stations) (Safety Zones) (Applications Procedures and Control of Access) Regulations 2007 (SI No 2007/1948)'.  Safety zones required are also detailed within the Project Description.

## 12.9 Maximum Design Scenario

12.9.1.1 This section describes the parameters on which the infrastructure and other users assessment has been based. These are the project parameters which are judged to give rise to the maximum levels of effect on infrastructure and other user receptors. Should

Hornsea Four be constructed using different project parameters within the design envelope, then impacts would be the same or reduced, but they would not be any greater.

- 12.9.1.2 The MDS for infrastructure and other users is presented in [Table 12.13](#) along with the Maximum Design Scenario (MDS) upon which the assessments will be based. A summary of all MDS are presented in [Volume 4, Annex 5.1: Impacts Register](#).



**Table 12.13: Maximum design scenario for impacts on concerning oil and gas receptors.**

Impact	Embedded Mitigation Measures	Maximum Design Scenario	Justification
<i>Construction</i>			
<i>Oil and Gas Operational Impacts</i>			
Conflicts with oil and gas seismic survey activity within the Hornsea Four array area (IOU-C-6).	Secondary Co139  Tertiary: Co89 Co93 Co94 Co96 Co102 Co107 Co139	<p><b>Construction of 10 offshore platforms:</b></p> <ul style="list-style-type: none"> <li>Up to 6 small/medium offshore transformer substation platforms</li> <li>Up to 3 large offshore converter substation platforms</li> <li>1 offshore accommodation platform</li> <li>Construction of 180 Wind Turbine utilising the entire array area (600 km<sup>2</sup>)</li> </ul> <p><b>Safety zones:</b></p> <ul style="list-style-type: none"> <li>500 m safety zones around infrastructure under construction</li> <li>50 m safety zones around partially completed structures (for when construction has paused)</li> </ul> <p><b>Construction duration:</b></p> <ul style="list-style-type: none"> <li>Total duration of 54 months, but offshore construction likely to be approximately 3 years</li> <li>Foundation installation: 12 months</li> <li>Turbine installation: 2 years</li> <li>Platform installation: 2-year window with 2 months for each platform</li> <li>Cable installation: 14 months</li> </ul>	Parameters that create the greatest disruption to seismic survey activities in terms of area affected and duration.
Restriction on oil and gas drilling due to the placement of infrastructure within the Hornsea Four array area and within 500 m of the boundary of the Hornsea Four array area (IOU-C-7).	Secondary Co139  Tertiary: Co89 Co94 Co96 Co102 Co107	As above.	As above.

Impact	Embedded Mitigation Measures	Maximum Design Scenario	Justification
<p>Conflicts with oil and gas seismic activity along the Hornsea Four offshore ECC (IOU-C-8).</p>	<p>Secondary Co139</p> <p>Tertiary: Co57 Co89 Co94 Co96 Co102 Co107</p>	<ul style="list-style-type: none"> <li>• Three offshore HVAC booster stations located within the HVAC booster area of search</li> <li>• Six export cables utilising the entire length of the offshore ECC</li> </ul> <p><b>Safety zones:</b></p> <ul style="list-style-type: none"> <li>• 500 m safety zones around HVAC infrastructure under construction</li> <li>• 50 m safety zones around partially completed HVAC structures for when construction has paused</li> </ul> <p><b>Construction duration:</b></p> <ul style="list-style-type: none"> <li>• Total duration of 54 months, but offshore construction likely to be approximately 3 years</li> <li>• Foundation installation: 12 months</li> <li>• Turbine installation: 2 years</li> <li>• Platform installation: 2 year window with 2 months for each platform</li> <li>• Cable installation: 14 months</li> </ul>	<p>Parameters that create the greatest disruption to seismic survey activities in terms of area affected and duration.</p>
<p>Restriction on oil and gas drilling due to the placement of infrastructure within the offshore ECC and within 500 m of the Hornsea Four ECC (IOU-C-9).</p>	<p>Secondary Co139</p> <p>Tertiary: Co57 Co89 Co94 Co96 Co102 Co107</p>	<p>As above</p>	<p>As above</p>

Impact	Embedded Mitigation Measures	Maximum Design Scenario	Justification
<p>The piling of wind turbines and substation foundations will generate underwater noise that may cause acoustic interference with oil and gas seismic survey operations (IOU-C-10).</p>	<p>Secondary Co139</p> <p>Tertiary: Co89 Co94 Co96 Co102</p>	<p><b>Array Area (spatial MDS):</b></p> <ul style="list-style-type: none"> <li>• Monopile foundations</li> <li>• 180 WTCs</li> <li>• Six offshore transformer substations</li> <li>• Three offshore converter substations</li> <li>• One offshore accommodation platform</li> <li>• Maximum hammer energy 5,000 kJ</li> <li>• 4-hour piling duration</li> <li>• 1.2 days per monopile</li> <li>• 216 piling days (single vessel)</li> <li>• 106 piling days (2 vessels)</li> </ul> <p><b>Array Area (temporal MDS):</b></p> <ul style="list-style-type: none"> <li>• 180 WTCs on piled jacket foundations (3 piles per jacket) – 540 pin piles</li> <li>• Six offshore transformer substations on piled jacket foundations (6 legs per jacket and 4 piles per leg – 144 pin piles)</li> <li>• Three offshore converter substations on piled jacket foundations (8 legs per jacket and 2 piles per leg – 48 pin piles)</li> <li>• One offshore accommodation platform on a piled jacket foundation (6 legs and 4 piles per leg – 24 pin piles)</li> <li>• Total of 756 pin piles in the array</li> <li>• Maximum hammer energy 2,500 kJ</li> <li>• 1.5 days per jacket foundation</li> <li>• 270 piling days (single vessel)</li> <li>• 135 days (2 vessels)</li> </ul> <p><b>HVAC Booster Area of Search (spatial MDS):</b></p> <ul style="list-style-type: none"> <li>• Three HVAC booster stations on monopile foundations</li> <li>• Maximum hammer energy 5,000 kJ</li> <li>• 4-hour piling duration</li> <li>• 1.2 days per monopile</li> </ul>	<p>Parameters that equates to the largest number of piling activities and for the greatest duration.</p>

Impact	Embedded Mitigation Measures	Maximum Design Scenario	Justification
		<p><b>HVAC Booster Area of Search (temporal MDS):</b></p> <ul style="list-style-type: none"> <li>• Three HVAC booster stations on piled jackets (6 legs per jacket and 4 piles per leg – 72 pin piles)</li> </ul> <p><b>Interconnector cable installation:</b></p> <ul style="list-style-type: none"> <li>• 6 circuits/cables</li> <li>• Total length of interconnector cables: 90 km</li> <li>• Total duration of cable installation: 24 months</li> </ul> <p><b>Export cable installation:</b></p> <ul style="list-style-type: none"> <li>• Where possible, the export cables will be buried below the seabed through to landfall.</li> <li>• Total length of export cables: 654 km</li> <li>• Total duration of cable installation: 24 months</li> </ul>	
<i>Oil and Gas Operations: General</i>			
<p>The potential impacts of piling at Hornsea Four on the safety of diving operations that may be required at oil and gas assets (IOU-C-11).</p>	<p>Secondary Co139</p> <p>Tertiary Co89 Co94 Co96 Co102</p>	<p>As above.</p>	<p>As above.</p>

Impact	Embedded Mitigation Measures	Maximum Design Scenario	Justification
<i>Operation</i>			
<i>Oil and Gas Operational Impacts</i>			
Conflicts with oil and gas seismic survey activity within the Hornsea Four array area (IOU-O-12).	Secondary Co139  Tertiary Co57 Co89	<p><b>Presence of installed infrastructure:</b></p> <ul style="list-style-type: none"> <li>Up to 10 offshore platforms</li> <li>3 small/medium offshore transformer substation platforms</li> <li>6 larger offshore converter substation platforms</li> <li>1 offshore accommodation platform</li> <li>Up to 180 wind turbines utilising the entire array area (600 km<sup>2</sup>)</li> <li>Anticipated design life: 35 years</li> </ul> <p><b>Safety zones:</b></p> <ul style="list-style-type: none"> <li>500 m safety zones around HVAC infrastructure under construction;</li> <li>50 m safety zones around partially completed HVAC structures for when construction has paused.</li> </ul>	Parameters that create the greatest disruption to seismic survey activities in terms of area affected and duration.
Restriction on oil and gas drilling due to the presence of infrastructure within the Hornsea Four array and within 500 m from the boundary (IOU-O-13).	Secondary Co139  Tertiary Co57 Co89	As above.	As above.
Conflicts with oil and gas seismic survey activity along the Hornsea Four offshore ECC (IOU-O-14).	Secondary Co139  Tertiary Co57 Co89	<p><b>Presence of installed infrastructure:</b></p> <ul style="list-style-type: none"> <li>Up to three offshore HVAC substations;</li> <li>Up to six export cables utilising the offshore ECC</li> <li>500 m safety zone around HVAC infrastructure undergoing maintenance;</li> <li>Anticipated design life: 35 years</li> </ul>	Parameters that create the greatest disruption to seismic survey activities in terms of area affected and duration

Impact	Embedded Mitigation Measures	Maximum Design Scenario	Justification
Restriction on oil and gas drilling due to the presence of infrastructure within the Hornsea Four offshore ECC and within 500 m from the boundary (IOU-O-15).	Secondary Co139  Tertiary Co57 Co89	As above.	As above.
<i>Oil and Gas Operations: Shipping and Navigation Impacts</i>			
Interference with the performance of the REWS located on oil and gas platforms (IOU-O-16).	Tertiary Co89 Co93	<p><b>Presence of installed infrastructure:</b></p> <ul style="list-style-type: none"> <li>• Up to 180 wind turbines utilising the entire array area (600 km<sup>2</sup>)</li> <li>• Up to 10 offshore platforms within the array area (up to 6 transformer substations, 3 convertor substations &amp; 1 accommodation platform)</li> <li>• Anticipated design life of 35 years</li> </ul> <p><b>Wind turbine dimensions:</b></p> <ul style="list-style-type: none"> <li>• Minimum height of lowest blade tip above Mean Sea Level (MSL): 35 m</li> <li>• Maximum blade tip height above Lowest Astronomical Tide (LAT): 370 m</li> <li>• Maximum rotor blade diameter: 305 m</li> </ul>	Parameters that present the greatest radar cross section.

Impact	Embedded Mitigation Measures	Maximum Design Scenario	Justification
<p>Wind turbines and associated infrastructure will form a physical obstruction and may disrupt vessel access to oil and gas platforms and subsurface infrastructure (IOU-O-17).</p>	<p>Secondary Co139</p> <p>Tertiary Co81 Co89 Co93</p>	<p><b>Presence of installed infrastructure:</b></p> <ul style="list-style-type: none"> <li>Up to 180 wind turbines utilising the entire array area (600 km<sup>2</sup>)</li> <li>Up to 10 offshore platforms within the array area (6 small transformer substations, 3 convertor substations &amp; 1 accommodation platform)</li> <li>Anticipated design life of 35 years</li> </ul> <p><b>Wind turbine dimensions:</b></p> <ul style="list-style-type: none"> <li>Minimum height of lowest blade tip above MSL: 35 m</li> <li>Maximum blade tip height above LAT: 370 m</li> <li>Maximum rotor blade diameter: 305 m</li> </ul> <p><b>Safety zones:</b></p> <ul style="list-style-type: none"> <li>500 m safety zones around infrastructure under construction</li> <li>50 m safety zones around incomplete structures</li> </ul>	<p>Parameters that create the greatest disruption to vessel access in terms of area affected and duration.</p>
<p>The presence of new wind turbines in previously open sea areas will deviate vessels which may cause a change in CPA alarms an oil and gas platforms protected by REWS (IOU-O-18).</p>	<p>Tertiary Co89 Co93</p>	<p><b>Presence of installed infrastructure:</b></p> <ul style="list-style-type: none"> <li>Up to 180 wind turbines utilising the entire array area (600 km<sup>2</sup>)</li> <li>Up to 10 offshore platforms within the array area (6 small transformer substations, 3 convertor substations &amp; 1 accommodation platform)</li> <li>Anticipated design life of 35 years</li> </ul> <p><b>Wind turbine dimensions:</b></p> <ul style="list-style-type: none"> <li>Minimum height of lowest blade tip above MSL: 35 m</li> <li>Maximum blade tip height above LAT: 370 m</li> <li>Maximum rotor blade diameter: 305 m</li> </ul> <p><b>Safety zones:</b></p> <ul style="list-style-type: none"> <li>500 m safety zones around infrastructure under construction</li> <li>50 m safety zones around incomplete structures</li> </ul>	<p>Parameters that create the greatest number of turbines with the greatest radar cross section.</p>

Impact	Embedded Mitigation Measures	Maximum Design Scenario	Justification
<p>Potential allision risk to oil and gas platforms due to vessels being deviated from existing routes due to the presence of the Hornsea Four infrastructure (IOU-O-19).</p>	<p>Secondary Co139</p> <p>Tertiary Co81 Co89 Co93</p>	<p><b>Presence of installed infrastructure:</b></p> <ul style="list-style-type: none"> <li>Up to 180 wind turbines utilising the entire array area (600 km<sup>2</sup>)</li> <li>Up to 10 offshore platforms within the array area (6 small transformer substations, 3 convertor substations &amp; 1 accommodation platform)</li> <li>Up to three HVAC booster stations within the HVAC booster station area of search</li> <li>Anticipated design life of 35 years</li> </ul> <p><b>Safety zones:</b></p> <ul style="list-style-type: none"> <li>500 m safety zones around infrastructure under construction</li> <li>50 m safety zones around incomplete structures</li> </ul>	<p>Parameters that create the greatest reduction in available sea room and are most likely to give rise to deviation of shipping from existing routes.</p>
<p><i>Oil and Gas Operations: Aviation Impacts</i></p>			
<p>Potential impacts on helicopter access to existing oil and gas platforms (IOU-O-20).</p>	<p>Tertiary Co99</p>	<p><b>Presence of installed infrastructure:</b></p> <ul style="list-style-type: none"> <li>Up to 180 wind turbines utilising the entire array area (600 km<sup>2</sup>)</li> <li>Up to 10 offshore platforms within the array area (6 small transformer substations, 3 convertor substations &amp; 1 accommodation platform)</li> <li>Anticipated design life of 35 years</li> </ul> <p><b>Wind turbine dimensions:</b></p> <ul style="list-style-type: none"> <li>Minimum height of lowest blade tip above MSL: 35 m</li> <li>Maximum blade tip height above LAT: 370 m</li> <li>Maximum rotor blade diameter: 305 m</li> </ul>	<p>The maximum number of wind turbines and other structures within the array area affecting the operation of helicopters approaching or departing from oil and gas platforms.</p>
<p>Potential impacts on helicopter access to oil and gas vessels operating in the vicinity of platforms and/or subsea assets (IOU-O-21).</p>	<p>Tertiary Co99</p>	<p>As above.</p>	<p>As above in relation to helicopter access to oil and gas vessels.</p>



Impact	Embedded Mitigation Measures	Maximum Design Scenario	Justification
<p>Potential impacts of Hornsea Four helicopter operations on the available airspace for oil and gas related helicopter operations (IOU-O-22).</p>	<p>Tertiary Co99</p>	<p><b>Annual Helicopter Return Trips:</b></p> <ul style="list-style-type: none"> <li>• Wind turbine installation: 135</li> <li>• Wind turbine foundation installation: 180</li> <li>• Substation platform installation (all offshore substations and accommodation platform): 63</li> <li>• Substation foundations installation (all offshore substations and accommodation platform): 42</li> <li>• Offshore Export cable installation: 800</li> <li>• Inter-array and offshore interconnector cables installation: 396</li> <li>• Anticipated design life of 35 years</li> </ul>	<p>Maximum number of helicopter operations at Hornsea Four restricting available airspace for use by helicopters servicing the oil and gas industry.</p>
<p>Potential impacts on HMRs used by helicopters supporting oil and gas operations (IOU-O-23).</p>	<p>Tertiary Co99</p>	<p><b>Presence of installed infrastructure:</b></p> <ul style="list-style-type: none"> <li>• Up to 180 wind turbines utilising the entire array area (600 km<sup>2</sup>)</li> <li>• Up to 10 offshore platforms within the array area (6 small transformer substations, 3 convertor substations &amp; 1 accommodation platform)</li> <li>• Up to 4 HVAC booster stations within the HVAC booster station area of search</li> <li>• Anticipated design life of 35 years</li> </ul> <p><b>Wind turbine dimensions:</b></p> <ul style="list-style-type: none"> <li>• Minimum height of lowest blade tip above MSL: 35 m</li> <li>• Maximum blade tip height above LAT: 370 m</li> <li>• Maximum rotor blade diameter: 305 m</li> </ul>	<p>The presence of the greatest number/size of infrastructure affecting use of the established HMRs (which may have consequential impacts on oil and gas operations).</p>

Impact	Embedded Mitigation Measures	Maximum Design Scenario	Justification
<i>General</i>			
Potential interference of Hornsea Four turbines with microwave links disrupting oil and gas communications (IOU-O-24).	Tertiary Co89 Co93	<b>Wind turbine dimensions:</b> <ul style="list-style-type: none"> <li>Minimum height of lowest blade tip above MSL: 35 m</li> <li>Maximum blade tip height above LAT: 370 m</li> <li>Maximum rotor blade diameter: 305 m</li> </ul> <b>Presence of installed infrastructure:</b> <ul style="list-style-type: none"> <li>One accommodation platform with max height above LAT of 64 m</li> <li>Six small platforms with a height of 90 m</li> <li>Three large offshore platforms with height of 100 m LAT</li> <li>Anticipated design life of 35 year</li> </ul>	Parameters that create the greatest number of turbines with the greatest radar cross section.
<i>Decommissioning</i>			
<i>Oil and Gas Operational Impacts</i>			
Conflicts with oil and gas seismic survey activity within the Hornsea Four array area (IOU-D-25).	Secondary Co139  Tertiary Co89	<b>Decommissioning:</b> <ul style="list-style-type: none"> <li>180 wind turbines</li> <li>10 offshore platforms within the array area (6 small transformer substations, 3 convertor substations &amp; 1 accommodation platform)</li> <li>500 m safety zone around infrastructure being decommissioned</li> </ul> Decommissioning period of 3 years	Parameters that create the greatest disruption to seismic survey activities in terms of area affected and duration.
Restriction on oil and gas drilling due to the removal of infrastructure from within the Hornsea Four array area and within 500 m of the boundary (IOU-D-26).	Secondary Co139  Tertiary Co89	As above.	Parameters that represent the largest area within which decommissioning would occur thereby restricting drilling operations.
Conflicts with oil and gas seismic survey activity along the Hornsea Four offshore ECC (IOU-D-27).	Secondary Co139  Tertiary Co89	<b>Decommissioning:</b> <ul style="list-style-type: none"> <li>Three HVAC substations</li> <li>Six export cables</li> <li>Removal of cables utilising the entire offshore ECC</li> <li>500 m safety zone around infrastructure being decommissioned</li> </ul> Decommissioning period of 3 years	Parameters that create the greatest disruption to seismic survey activities in terms of area affected and duration.

Impact	Embedded Mitigation Measures	Maximum Design Scenario	Justification
Restriction on oil and gas drilling due to the removal of infrastructure from within the offshore ECC and within 500 m of the boundary of the ECC (IOU-D-28).	Secondary Co139  Tertiary Co89	As above.	Parameters that represent the largest area within which decommissioning would occur thereby restricting drilling operations.
<i>Oil and Gas Operations: General</i>			
The potential decommissioning at Hornsea Four on the safety of diving operations that may be required at oil and gas assets (IOU-D-29).	Secondary Co139  Tertiary Co89 Co94 Co96 Co102	As above.	As above.

## 12.10 Impact Assessment

12.10.1.1 There are four main categories of potential impacts upon oil and gas receptors/operations as follows:

- Those that relate to the development of the oil and gas (including seismic surveys and drilling);
- Those that relates to safe shipping and navigation as required for the operation of the oil and gas industry;
- Those that relate to helicopter access to oil and gas infrastructure and vessels; and
- Those which relate to general safe operations of the oil and gas industry.

12.10.1.2 The following sections set out the potential impacts of Hornsea Four on oil and gas operations and assets. Currently the Applicant is completing a series of further assessments in response to the consultation completed with relevant operators. These studies will be incorporated into an oil and gas assessment that will accompany the final DCO application.

12.10.1.3 For the purposes of this PEIR, therefore, the potential impacts are identified and discussed and the proposed approach to the more detailed assessment process to support the DCO application is described.

12.10.1.4 The scope and approach to the oil and gas assessment will be developed in consultation with relevant oil and gas operators and with due regard to the specific characteristics of their operations and assets.

### 12.10.2 Oil and Gas Operations: Development operations (seismic survey, drilling etc) – all phases

#### Conflicts with oil and gas seismic survey activity within the Hornsea Four array area (IOU-C-6).

12.10.2.1 The installation of Hornsea Four infrastructure within the array area, and associated safety zones, has the potential to exclude or otherwise interfere with seismic surveys (particularly surveys conducted by conventional towed streamer seismic survey vessels) planned in the vicinity by oil and gas operators.

12.10.2.2 Although any seismic surveys within these blocks are anticipated to be restricted to some extent, it is noted that other methods of seismic survey, such as the use of ocean bottom cables and the use of fixed vertical cables, allow work to be completed in more congested environments. For example, the ocean bottom cables can be used when there is sea surface congestion (i.e. wind turbines, platforms) and the vertical cables can be used when the sea floor is congested (i.e. with cables or pipelines).

12.10.2.3 The area of overlap between the relevant licence blocks and the Hornsea Four array area is summarised in [Table 12.14](#) and shown in [Figure 12.2](#).

- 12.10.2.4 Spirit Energy currently has three licence blocks with a spatial overlap with the Hornsea Four array. Both Bridge Petroleum and Premier Oil have two licence blocks each that overlap with Hornsea Four, whilst there are a further eight unlicensed blocks with varying degrees of spatial overlap. These are detailed in [Table 12.14](#).
- 12.10.2.5 It is noted that the application of 500 m safety zones during construction, decommissioning and exceptional maintenance operations (under the provisions of the Energy Act, 2004) will temporarily increase the area of overlap, e.g. for infrastructure at the edge of the array area boundary.
- 12.10.2.6 A typical seismic survey period is six months and therefore there is the potential for surveys to take place within parts of the licenced blocks where construction /decommissioning activity has not yet commenced. For surveys in areas of active construction or where partially completed structures have been installed, and during the operational phase, there is the potential for an effect on survey operations.
- 12.10.2.7 It is noted that there are a relatively small number of licence blocks and operators that could be affected. In preparing the final oil and gas assessment, the Applicant will continue to consult with relevant operators with regards to potential seismic survey requirements and the final assessment will consider the potential interactions and the requirement for management measures to ensure effects are minimised.

**Table 12.14: Area of overlap of each licence block with the Hornsea Four array area.**

Block	Operator	Area of Overlap Array (%)
42/30d	Bridge Petroleum	30.93 %
43/26c		91.06%
43/26a	Premier Oil	15.31 %
43 /27a		100%
48/2a	Spirit Energy	0.82 %
48/2b		11.59 %
48/3		5.64 %
43/25b	Unlicensed	9.57 %
43/21c		31.90 %
43/22c		7.62 %

Block	Operator	Area of Overlap Array (%)
43/26b		99.85%
43 /27b		90.11%
43 /27c		88.74 %
43/28		39.32 %
43/29a		2.78 %

### Restriction on oil and gas drilling due to the placement of infrastructure within the Hornsea Four array and within 500 m of the boundary (IOU-C-7).

12.10.2.8 Drilling and the placement of infrastructure associated with gas field development or natural gas storage may be restricted (but not prohibited) within the Hornsea Four array area during the construction, operational and decommissioning phases, due to the presence of the Hornsea Four infrastructure (and where relevant associated safety zones).

12.10.2.9 Drilling is restricted by the ability of the drill rig or vessel to access the drill location. For drilling to occur within the array area it would be dependent on the final layout of the wind turbines, offshore platforms and array and interconnector cables. It is noted that it is sometimes possible to directionally drill into a well location within the array if required.

12.10.2.10 The relevant operators with rights to licence blocks with spatial overlap with the Hornsea Four array area are summarised in [Table 12.14](#) above.

12.10.2.11 As for seismic surveys, it is noted that there are a relatively small number of licence blocks and operators that could be affected. In preparing the final oil and gas assessment, the Applicant will continue to consult with relevant operators with regards to planned development activities and the potential for drilling within the Hornsea Four array area; the final assessment will consider the potential interactions and the requirement for management measures to ensure effects are minimised.

### Conflicts with oil and gas seismic activity within the Hornsea Four offshore ECC (IOU-C-8).

12.10.2.12 Cable and HVAC installation, as well as safety zones of 500 m around the construction, decommissioning and maintenance of the HVAC booster stations within the ECC, have the potential to exclude or limit conventional towed streamer seismic survey vessels.

12.10.2.13 The area of overlap between the relevant licence blocks and the Hornsea Four ECC and offshore HVAC booster station search area, is presented in [Table 12.15](#). The overlap with the HVAC booster station search area, within which the HVAC booster stations will be installed, will be much smaller than the search area presented, as each of the HVAC

booster stations will occupy an area of approximately 16,200 m<sup>2</sup> (length of 180 m, width of 90 m and height of 100 m).

12.10.2.14 For export cable installation (or cable maintenance), the impact on seismic survey operations that are planned to occur at the same time will be restricted spatially with installation activities in any one location occurring for a relatively limited period.

12.10.2.15 For the HVAC booster stations, seismic surveys would be affected during the construction period and, due to the ongoing presence of these structures, for the life of Hornsea Four. However, the area affected will be relatively small even when accounting for safety zones applied during the construction phase or for exceptional maintenance activities.

12.10.2.16 It is noted that there are a relatively small number of licenced blocks and operators that could be affected. In preparing the final oil and gas assessment, the Applicant will continue to consult with relevant operators with regards to potential seismic survey requirements within the ECC and the final assessment will consider the potential interactions and the requirement for management measures to ensure effects are minimised.

**Table 12.15: Area of overlap of each licence block with offshore ECC /offshore HVAC booster station search area.**

Block	Operator	Area of overlap with offshore ECC (%)	Area of overlap with offshore HVAC booster station search area (%)
42/29a	Perenco	10.19 %	N/A
42/30a		3.04 %	N/A
48/1d <sup>4</sup>		21.14 %	N/A
47/4b		32.23 %	N/A
48/2a	Spirit Energy	25.86 %	N/A
48/2b		4.60 %	N/A
42/28d	Premier Oil	33.50%	15%
43/26a	Premier Oil/Perenco	30.30%	N/A
41/29b	Unlicensed	42.15%	N/A

<sup>4</sup> Licence block previously owned by BP, through pre-application consultation it has been identified that Perenco now operate BPs' licences

Block	Operator	Area of overlap with offshore ECC (%)	Area of overlap with offshore HVAC booster station search area (%)
41/30	Unlicensed	29.15%	N/A
42/26	Unlicensed	13.91%	N/A
42/27	Unlicensed	15.24%	18.11%
42/28e	Unlicensed	25.69%	N/A
42/29b	Unlicensed	12.84%	N/A
42/29c	Unlicensed	44.02%	N/A
42/30c	Unlicensed	46.69%	N/A
43/27c	Unlicensed	12.40%	N/A
47/4d	Unlicensed	0.12 %	N/A
47/5d	Unlicensed	8.23 %	N/A

### Restriction on oil and gas drilling due to the placement of infrastructure within the offshore ECC and within 500 m of the ECC boundary (IOU-C-9).

12.10.2.17 Drilling and the placement of infrastructure associated with gas field development or natural gas storage may be restricted (but not prohibited) within the Hornsea Four ECC during the construction, operational and decommissioning phases, due to the presence of the Hornsea Four export cables and HVAC booster stations (and where relevant associated safety zones).

12.10.2.18 Drilling is restricted by the ability of the drill rig or vessel to access the drill location. For drilling to occur within the ECC area it would be dependent on the final layout of the export cables and the location and layout of the HVAC booster stations. It is noted that it is sometimes possible to directionally drill into a well location within the ECC if required.

12.10.2.19 The relevant operators with rights to licence blocks with spatial overlap with the Hornsea Four ECC are summarised in [Table 12.15](#).

12.10.2.20 In preparing the final oil and gas assessment, the Applicant will continue to consult with relevant operators with regards to planned development activities and the potential for



drilling within the ECC. The final assessment will consider the potential interactions and the requirement for management measures to ensure effects are minimised.

### **The piling of wind turbines and substation foundations will generate underwater noise that may cause acoustic interference with oil and gas seismic survey operations (IOU-C-10).**

12.10.2.21 The piling of wind turbine and platform foundations will generate substantial levels of underwater noise which may, in turn, interfere with oil and gas seismic surveys where these are being carried out simultaneously with piling operations. As piling will only occur during the construction of Hornsea Four, this potential impact will only effect oil and gas receptors in the construction phase of works.

12.10.2.22 During conventional towed streamer seismic surveys, air guns produce a source noise which is reflected back off the seabed and picked up by acoustic recorders at the sea surface. The peak source level is around 230 dB over a range of frequencies but the <100 Hz range is of greatest interest. The sound repetition is every 1 to 60 seconds. A survey may last up to six months depending on the spatial extent. Firing duration will be continual subject to operational requirements.

12.10.2.23 Underwater noise from piling activities will produce similar sound pressure and frequencies. Piling noise will occur at a much greater repetition, but for only a short period at each fixed location, but over a much longer overall duration.

12.10.2.24 Due to these different temporal and spatial requirements the two activities have the potential to be able to occur concurrently. In addition, the potential for any interference will dissipate with distance from the piling activity. Blocks immediately adjacent to the Hornsea Four array area (and the offshore HVAC booster station search area) have the greatest potential to be affected.

12.10.2.25 The extent of the potential impact on the seismic survey activity will be dependent on the survey coinciding temporally and spatially with the Hornsea Four piling and the two operations having similar acoustic frequencies. The actual techniques that will be used during the survey work, for example the ability for live or post-processing of seismic data to filter out acoustic interference, will affect the sensitivity of the seismic survey data collection to piling noise.

12.10.2.26 In preparing the final oil and gas assessment, the Applicant will continue to consult with relevant operators with regards to potential impacts of construction activities on seismic surveys. The final assessment will consider the potential interactions and the requirement for management measures to ensure effects are minimised.

### **12.10.3 Oil and Gas Operations: Shipping and Navigation – all phases**

#### **Interference with the performance of the REWS located on oil and gas platforms (IOU-O-16).**

12.10.3.1 Wind farm turbines and associated offshore structures (such as accommodation platforms and offshore substations) located within the line-of-sight (LOS) of radars, have the

potential to interfere with radar performance, degrading the operational capability of the radar warning system.

- 12.10.3.2 REWS are primarily used to detect and track vessels navigating within the vicinity of offshore oil and gas assets and provide collision warning when vessels are in breach of defined CPA and TCPA parameters. The impact of offshore wind farms on REWS may arise from a number of factors such as; high radar returns from the turbines and associated offshore structures, increased number of detections and false alarm/track generation.
- 12.10.3.3 Offshore wind turbines are large structures with geometries and materials that may cause them to have a high radar cross-section. This can result in the windfarm generated radar reflections interpreted by the REWS as approaching vessels i.e. a false positive. Furthermore, the REWS, when attempting to interpret large numbers of reflections from within the array area, may require more computing power than was available causing it to run too slowly.
- 12.10.3.4 If a disruption in the REWS was to occur, the system may be unable to detect vessels approaching the platform and an emergency production shutdown may have to occur due to a vessel being on a collision course with the platform. This could result in loss of production, affecting economic productivity. Shutdowns can also result in secondary impacts such as equipment failure and thereby increasing cost.
- 12.10.3.5 A REWS study will be undertaken by Manchester University for each of the platforms with a REWS system; the outputs of this study will be used to inform the assessment of shipping and navigational risk and impacts on the safety case for platform operators as part of the final oil and gas assessment. The assessment will be completed following further consultation with the relevant operators.

**The presence of new wind turbines in previously open sea areas will deviate vessels which may cause a change in CPA alarms at oil and gas platforms protected by REWS (IOU-O-18).**

- 12.10.3.6 Existing shipping lanes may be altered by the physical presence of the Hornsea Four array area which may result in vessels rerouting in closer proximity to platforms than is currently the case.
- 12.10.3.7 For those platforms protected by REWS, this may cause a change in the CPA/TCPA alarm rates at these platforms. An alarm will trigger a set of operational safety procedures to protect the platform integrity and personnel on board, ranging from making direct platform to vessel communication, interception by an emergency response vessel, or abandonment of the platform.
- 12.10.3.8 The REWS uses the radar returns to monitor and track vessels within the detection region and alert the operator when a proximity violation or a collision threat is detected. The REWS uses a defined set of rules to identify a breach of the CPA and TCPA parameters. Typically, an Amber alarm is raised if a vessel is within CPA of 0.5 nm and a Red alarm is triggered if the CPA of a vessel is 0.27 nm or less. The Red TCPA alarms are raised for vessels that are on a collision vector 25 minutes away and an Amber alarm is raised for

vessels that are 35 minutes away. To avoid alarms due to temporary vector breach of the TCPA while vessels are turning, TCPA alarms are only triggered if the vessel's vector remains in breach of the TCPA condition for a set number of radar rotations (typically 10 radar rotations).

12.10.3.9 The CPA and TCPA alarms form an integral part of the REWS, which, when installed, plays a fundamental part of an operator's anti-collision safety systems on their platform.

12.10.3.10 An assessment will be provided in the final application which considers the effect of rerouted shipping lanes on platforms which are protected by REWS. The assessment will be completed following further consultation with the relevant operators.

### **Wind turbines and associated infrastructure will form a physical obstruction and may disrupt vessel access to oil and gas platforms and subsurface infrastructure (IOU-O-17).**

12.10.3.11 The presence of the Hornsea Four infrastructure gives rise to the potential disruption of vessel access to oil and gas platforms and subsea infrastructure. This may be as a result of oil and gas vessels having to reroute around the infrastructure which may increase transit times, and which may have a potential impact on efficient oil and gas operations. Further to this, the presence of Hornsea Four may impact the ability to safely manoeuvre jack up rigs onto, and off location at platforms.

12.10.3.12 Vessel visits may be planned (e.g. in order to change crews or carry out pre-planned work) or may be unplanned (i.e. arranged at short notice in order to respond to a problem). Disruptions to the former may extend periods of planned reductions in production whilst delays to the latter may result in increased downtime. The costs of running offshore installations (incurred whether or not they are producing) are such that high up-time is required in order to be commercially viable.

12.10.3.13 The potential disruption to vessel access to oil and gas operations as a result of the operation of Hornsea Four infrastructure will be assessed as part of the oil and gas assessment to accompany the final application. The assessment will be completed following further consultation with the relevant operators.

### **Potential collision risk to oil and gas platforms due to vessels being deviated from existing routes due to the presence of the Hornsea Four infrastructure (IOU-O-19).**

12.10.3.14 The presence of Hornsea Four may result in vessels deviating so as to avoid the wind farm which may result in them routing closer to oil and gas infrastructure; this has the potential to increase ship to platform collision risk.

12.10.3.15 An increased collision risk may arise as a result of a reduction in available sea room to operate safely. As the sea room required is dependent upon the met-ocean conditions it may be that operations can still be performed under some conditions but not under others. The more limited the conditions for safe operation, the more time may be spent "waiting on weather" with potential cost implications.

12.10.3.16 The presence of pre-commissioned oil and gas infrastructure, including platforms, within the Hornsea Four array area and offshore ECC, or in the near vicinity, may cause increased vessel to structure allision risk external to the array for vessels in a previously open sea area. This may, as a result, damage vessels and/or infrastructure. Displacement of third-party passing traffic may increase the traffic density and hence the risk of allision with installations. This may also include the displacement of fishing vessel operations towards oil and gas platforms which may increase the risk of allision with operator platforms.

12.10.3.17 The potential increased allision risk for oil and gas operators as a result of the Hornsea Four infrastructure will be assessed as part of the oil and gas assessment to accompany the final application. The assessment will be completed following further consultation with the relevant operators.

#### **12.10.4 Oil and Gas Operations: Aviation**

##### **Potential impacts on helicopter access to existing platforms (IOU-O-20).**

12.10.4.1 Potential impacts on helicopter access to existing oil and gas platforms may arise as a result of the presence of the Hornsea Four infrastructure, particularly within the array area.

12.10.4.2 Oil and gas operators rely on helicopter access platforms for both planned operations (e.g. in order to change crews or carry out pre-planned work) or unplanned (i.e. arranged at short notice in order to respond to a problem).

12.10.4.3 Wind turbines are considered as physical obstructions for helicopters and as such a minimum clearance is required to maintain safe flying operations. The wind turbines will also reduce the volume of airspace available for approach procedures to platforms where these need to occur in close vicinity to the turbines, depending upon the directional approach taken.

12.10.4.4 As part of the oil and gas assessment, which will be submitted as part of the final application, the Applicant will assess the impacts of the Hornsea Four infrastructure on helicopter operations at each of the potentially affected platforms. The assessment will be completed following further consultation with the relevant operators. A preliminary assessment of the potential impacts on helicopter access to other airspace users is provided in **Volume 2, Chapter 9, Aviation and Radar** of the PEIR which will be subject to the conclusions drawn from the oil and gas assessment at application.

##### **Potential impacts on helicopter access to oil and gas vessels operating in the vicinity of platforms and/or subsea assets (IOU-O-21).**

12.10.4.5 Subsurface infrastructure and wells, that have not been permanently decommissioned or plugged and abandoned, as well operational manned and unmanned platforms, may at some time require access from a rig or other vessel; these vessels are often equipped with a helideck.

- 12.10.4.6 The presence of the Hornsea Four infrastructure, particularly in the array area, has the potential to affect the operation of helicopters to and from these vessels where they are stationed in close proximity to the Hornsea Four infrastructure as previously described in [paragraph 12.10.4.3](#).
- 12.10.4.7 As part of the oil and gas assessment, which will be submitted as part of the final application, an assessment of the impacts of the Hornsea Four infrastructure on helicopter operations for vessels and temporary rigs will be carried out. The assessment will be completed following further consultation with the relevant operators. A preliminary assessment of the potential impacts on helicopter access to other airspace users is provided in [Volume 2, Chapter 9, Aviation and Radar](#) of the PEIR which will be subject to the conclusions drawn from the oil and gas assessment at application.

#### **Potential impacts of Hornsea Four helicopter operations on the available airspace for oil and gas related helicopter operations (IOU-O-22).**

- 12.10.4.8 The presence of Hornsea Four will result in an increase in aviation traffic as a result of the project using helicopter access to the site during all phases of the development. This increase in helicopter traffic above the existing baseline has the potential to impact on helicopter access to the existing oil and gas platforms.
- 12.10.4.9 The baseline information details that there are a significant number of flights utilised by windfarm developers within the southern North Sea, as such available airspace may be affected. Whilst it is highly likely that there would be times when flight congestion introduces delays or route modifications, overall the impact of such issues is expected to be manageable through ongoing communication with oil and gas operators throughout the development of Hornsea Four. For consideration of the cumulative impact of Hornsea Four and other wind farm developments on oil and gas helicopter relations see the Cumulative Effect Assessment in [Section 12.11](#).
- 12.10.4.10 Nonetheless, as part of the oil and gas assessment to be submitted as part of the final application, the Applicant will assess the impacts of the use of helicopters to access the Hornsea Four infrastructure on the existing oil and gas related helicopter operations. The assessment will be completed following further consultation with the relevant operators. A preliminary assessment of the potential impacts on helicopter access to other airspace users is provided in [Volume 2, Chapter 9, Aviation and Radar](#) of the PEIR which will be subject to the conclusions drawn from the oil and gas assessment at application.

#### **12.10.5 Oil and Gas Operations: General**

##### **Potential interference of Hornsea Four turbines with microwave links disrupting oil and gas communications (IOU-O-24).**

- 12.10.5.1 The presence of the Hornsea Four turbines during the operational phase has the potential to impact on microwave links that may be used as part of the communications systems on oil and gas platforms. A microwave link is a communications system that uses a beam

of radio wave in the microwave frequency range to transmit information between two fixed locations. Microwave links operate on a 'line of sight' basis.

- 12.10.5.2 Hornsea Four will consult with the operators of the platforms in the vicinity of the array area to identify which, if any, platforms operate microwave links and the characteristics of those systems. An assessment of this potential impact arising from Hornsea Four on any microwave links will then be undertaken and included as part of the oil and gas assessment that will accompany the final application. The assessment will be completed following further consultation with the relevant operators.

### **The potential impacts of piling at Hornsea Four on the safety of diving operations that may be required at oil and gas assets (IOU-C-11).**

- 12.10.5.3 Piling operations for the installation of foundations (wind turbines and offshore platforms), as well as the decommissioning process, will generate potentially significant levels of underwater noise. This noise has the potential to affect the safe operation of divers engaged in work at adjacent oil and gas infrastructure.
- 12.10.5.4 The effect of piling (and decommissioning) on diving operations required by oil and gas operators will be subject to assessment as part of the oil and gas assessment to submitted as part of the final application. The assessment will be completed following further consultation with the relevant operators.

## **12.11 Cumulative Effect Assessment Methodology**

- 12.11.1.1 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 and is not limited to offshore wind projects.
- 12.11.1.2 A screening process has identified a number of reasonably foreseeable projects and developments which may act cumulatively with Hornsea Four. The full list of such projects that have been identified in relation to the offshore environment are set out in [Volume 4, Annex 5.3: Offshore Cumulative Effects](#) and [Volume 4, Annex 5.4: Location of Offshore Cumulative Schemes](#) are presented in a series of maps within the same document.
- 12.11.1.3 In assessing the potential cumulative impacts for Hornsea Four, it is important to bear in mind that some projects, predominantly those 'proposed' or identified in development plans, may not actually be taken forward, or fully built out as described within their MDS. There is therefore a need to build in some consideration of certainty (or uncertainty) with respect to the potential impacts which might arise from such proposals. For example, those projects under construction are likely to contribute to cumulative impacts (providing effect or spatial pathways exist), whereas those proposals not yet approved are less likely to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors.

12.11.1.4 With this in mind, all projects and plans considered alongside Hornsea Four have been allocated into ‘tiers’ reflecting their current stage within the planning and development process. This allows the cumulative impact assessment to present several future development scenarios, each with a differing potential for being ultimately built out. This approach also allows appropriate weight to be given to each scenario (tier) when considering the potential cumulative impact. The proposed tier structure that is intended to ensure that there is a clear understanding of the level of confidence in the cumulative assessments provided in the Hornsea Four PEIR is explained in [Table 12.16](#).

**Table 12.16: Description of tiers of other developments considered for Cumulative Effect Assessment (CEA) (adapted from PINS Advice Note 17).**

Tier 1	Project under construction.
	Permitted applications, whether under the Planning Act 2008 or other regimes, but not yet implemented.
	Submitted applications, whether under the Planning Act 2008 or other regimes, but not yet determined.
Tier 2	Projects on the Planning Inspectorate’s Programme of Projects where a Scoping Report has been submitted.
Tier 3	Projects on the Planning Inspectorate’s Programme of Projects where a Scoping Report has not been submitted.
	Identified in the relevant Development Plan (and emerging Development Plans with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited.
	Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.

12.11.1.5 The plans and projects selected as relevant to the CEA in relation to existing Infrastructure and Other Users, and specifically oil and gas operations and assets, are based on an initial screening exercise undertaken on a long list (see [Volume 4, Annex 5.3: Offshore Cumulative Effects](#) and [Volume 4, Annex 5.4: Location of Offshore Cumulative Schemes](#)). Consideration has been given to effect-receptor pathways, data confidence and temporal and spatial scales in order to select projects for a topic-specific short-list.

12.11.1.6 For the majority of potential effects for oil and gas interests, planned projects were screened into the assessment. The following criteria was used in the CEA screening process as based upon the study areas detailed in [Section 12.8.2](#):

- A 1 km buffer around Hornsea Four. This buffer is based upon the potential 500 m safety zones which will be applied for in relation Hornsea Four construction/ exceptional maintenance/ and decommissioning works together with the 500 m safety zones implemented around active oil and gas infrastructure;
- A 9 nm (16.67 km) buffer is used for project that may act in cumulative manner in relation to aviation access to oil and gas platforms within and in the vicinity of Hornsea Four; and
- A 35 km buffer is used around the Hornsea Four array for projects that have a cumulative impact on REWS.

12.11.1.7 The specific projects scoped into the CEA for oil and gas as well as the tiers into which they have been allocated are presented in [Table 12.17](#) below and are illustrated in [Figure 12.7](#).



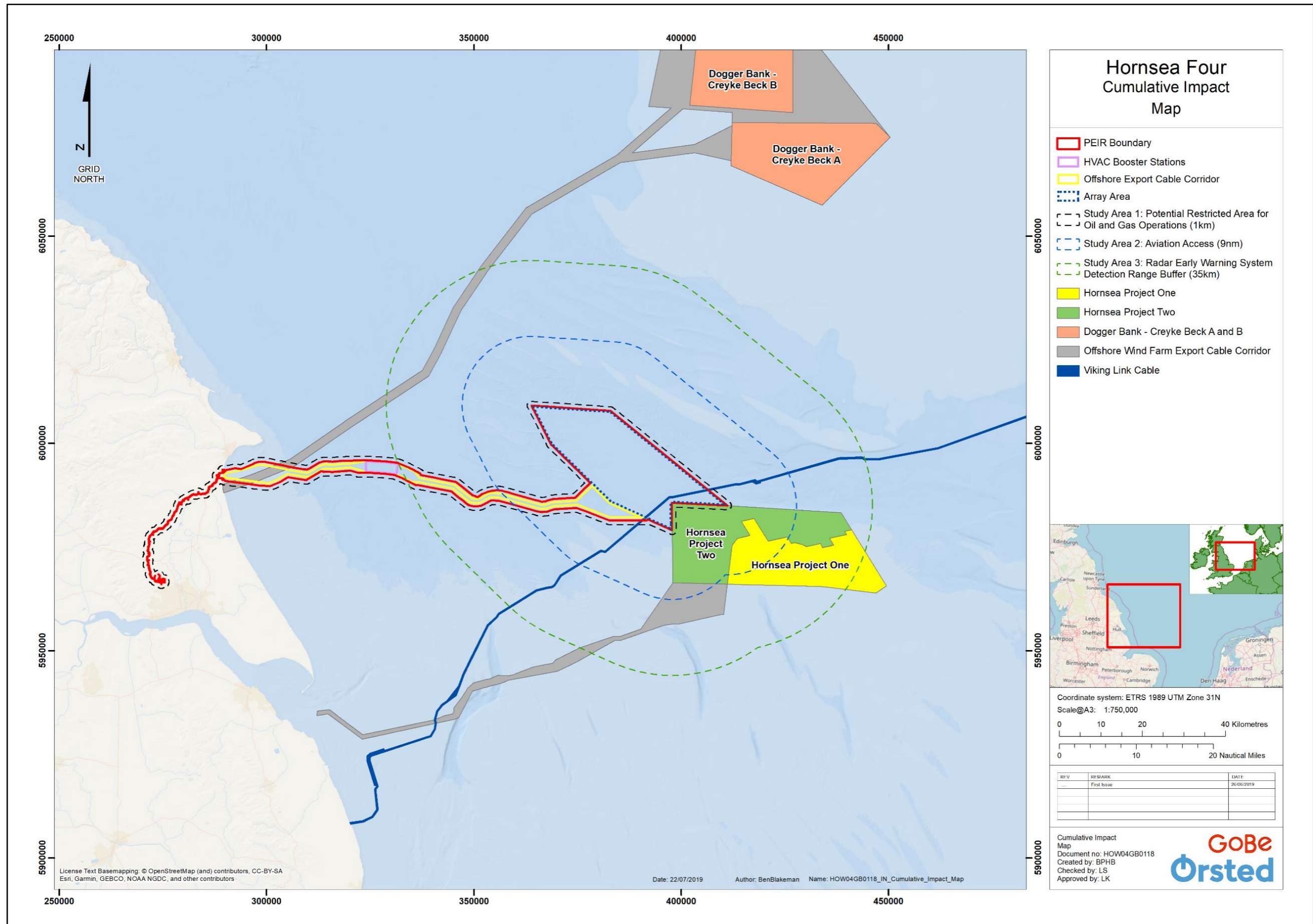


Figure 12.7: Projects Screened into the CEA (not to scale).

**Table 12.17: Project screened into the Infrastructure and Other Users cumulative effects assessment.**

Tier	Project/plan	Details/ relevant dates	Distance to Hornsea Four Array	Distance to Hornsea Four ECC	Distance to Hornsea Four HVAC Booster Station Search Area	Reason for inclusion in CEA
1	Hornsea Project Two	Consented: Construction expected 2020 - 2022	0.00	5.84	66.43	Potential temporal and spatial overlap of operation of Hornsea Project Two with the construction and operation of Hornsea Four. Hornsea Project Two is within all CEA screening ranges as detailed above in <a href="#">Section 12.11.1.2</a> .
1	Hornsea Project One	Consented: Operation in 2019	5.08	21.32	82.50	Potential temporal and spatial overlap of operation of Hornsea Project One with the construction and operation of Hornsea Four. Hornsea Project One is within all CEA screening ranges as detailed above in <a href="#">Section 12.11.1.2</a> .
1	Viking Link	Consented: Construction commencing in 2020 with operation in 2026	0.00	0.00	40.66	Potential temporal and spatial overlap of operation of Hornsea Two with the construction and operation of Hornsea Four. Within the 1 km buffer relating to potential restriction in placement of oil and gas infrastructure.
Dogger Bank Creyke Beck A Export Cables	Consented: Construction commencing in 2021 with operation in 2025	25.13	0.00	8.46	Potential temporal and spatial overlap of operation of Hornsea Two with the construction	Dogger Bank Creyke Beck A Export Cables

Tier	Project/plan	Details/ relevant dates	Distance to Hornsea Four Array	Distance to Hornsea Four ECC	Distance to Hornsea Four HVAC Booster Station Search Area	Reason for inclusion in CEA
					and operation of Hornsea Four. Within the 1 km buffer relating to potential restriction in placement of oil and gas infrastructure.	
1	Dogger Bank Creyke Beck B Export Cables	Consented: Construction commencing in 2020 with operation in 2025	25.13	0.00	8.46	Potential temporal and spatial overlap of operation of Hornsea Two with the construction and operation of Hornsea Four. Within the 1 km buffer relating to potential restriction in placement of oil and gas infrastructure.
Hornsea Project Two Export Cables	Consented: Construction expected 2020 - 2022	0.00	8.51	>50	Potential temporal and spatial overlap of operation of Hornsea Two with the construction and operation of Hornsea Four. Within the 1 km buffer relating to potential restriction in placement of oil and gas infrastructure.	Hornsea Project Two Export Cables

12.11.1.8 Certain impacts assessed for the project alone are not considered in the cumulative assessment due to:

- There being no temporal overlap of phases for projects screened in the CEA; and
- Management measures in place for Hornsea Four will also be in place on other projects reducing the risk of significant cumulative effects occurring.

12.11.1.9 The impacts excluded from the CEA for the above reasons are:

- Potential conflicts with oil and gas seismic activity along the Hornsea Four offshore ECC;
- Potential effect of restriction on oil and gas drilling and the placement of infrastructure within the offshore ECC and within 500 m of the Hornsea Four ECC;
- Effect of piling of wind turbines and substation foundations will generate underwater noise that may cause acoustic interference with oil and gas seismic survey operations; and
- The potential impacts of piling at Hornsea Four on the safety of diving operations that may be required at oil and gas assets.

12.11.1.10 Although several cables have been scoped into the CEA, due to their proximity to Hornsea Four, it is expected that commercial crossing agreements will be agreed upon between developers and asset owners. As such it is considered unlikely that any significant cumulative impacts would occur the issue is not considered further in the CEA. Therefore, the only two projects which are considered to have the potential to act in a cumulative manner with Hornsea Four on oil and gas receptors are Hornsea Project One Offshore Wind Farm and Hornsea Project Two Offshore Wind Farm.

12.11.1.11 As detailed above in [paragraph 12.10.1.1](#) no assessment of the potential effects of Hornsea Four on oil and gas receptors has been undertaken to date; an oil and gas assessment will be completed to accompany the final application. This assessment will include the CEA. [Table 12.18](#) identifies the potential impacts that will be considered in the CEA and the associated maximum design scenario.

**Table 12.18: Cumulative maximum design scenario for Infrastructure and Other Users.**

Project Phase	Potential Impact	Maximum Design Scenario	Justification
<i>Oil and Gas Operations: Development Impacts</i>			
Operation	Cumulative effect of conflicts with oil and gas seismic survey activity within the Hornsea Four array area alongside other plans/projects.	<p>Maximum design scenario for Hornsea Four plus the full development of the following projects within 1km of Hornsea Four:</p> <p><b>Tier 1:</b></p> <ul style="list-style-type: none"> <li>- Consented projects not yet under construction (Hornsea Project Two).</li> </ul> <p><b>Tier 2:</b></p> <ul style="list-style-type: none"> <li>- No Tier 2 projects identified.</li> </ul> <p><b>Tier 3:</b></p> <ul style="list-style-type: none"> <li>- No Tier 3 projects identified.</li> </ul>	Maximum scenario which reduces the readily available space in licence blocks for oil and gas seismic surveys.
Operation	Cumulative effect of restriction on oil and gas drilling around the placement of infrastructure within the Hornsea Four array and within 500 m of the boundary at the Hornsea Four array area alongside other plans/projects.	<p>Maximum design scenario for Hornsea Four plus the full development of the following projects within 1 km of Hornsea Four:</p> <p><b>Tier 1:</b></p> <ul style="list-style-type: none"> <li>- Consented projects not yet under construction (Hornsea Project Two).</li> </ul> <p><b>Tier 2:</b></p> <ul style="list-style-type: none"> <li>- No Tier 2 projects identified.</li> </ul> <p><b>Tier 3:</b></p> <ul style="list-style-type: none"> <li>- No Tier 3 projects identified.</li> </ul>	Maximum scenario in which oil and gas drilling activity may be restricted.
<i>Oil and Gas Operation: Aviation Impacts</i>			
Operation	Cumulative effect of impacts on helicopter access to existing platforms.	<p>Maximum design scenario for Hornsea Four plus the full development of the following projects within 9 nm of Hornsea Four:</p> <p><b>Tier 1:</b></p> <ul style="list-style-type: none"> <li>- Consented project not yet under construction (Hornsea Project Two).</li> <li>- Consented project under construction (Hornsea Project One).</li> </ul> <p><b>Tier 2:</b></p> <ul style="list-style-type: none"> <li>- No Tier 2 projects identified.</li> </ul> <p><b>Tier 3:</b></p> <ul style="list-style-type: none"> <li>- No Tier 3 projects identified.</li> </ul>	This includes other developments which have the potential to affect access to platforms, leading to the maximum potential impact upon access to an individual platform.

Project Phase	Potential Impact	Maximum Design Scenario	Justification
Operation	Cumulative effect of impacts on helicopter access to vessels operating in the vicinity of platforms and/or subsea assets.	<p>Maximum design scenario for Hornsea Four plus the full development of the following projects within 9nm of Hornsea Four:</p> <p><b>Tier 1:</b></p> <ul style="list-style-type: none"> <li>- Consented project not yet under construction (Hornsea Project Two).</li> <li>- Consented project under construction (Hornsea Project One).</li> </ul> <p><b>Tier 2:</b></p> <ul style="list-style-type: none"> <li>- No Tier 2 projects identified.</li> </ul> <p><b>Tier 3:</b></p> <ul style="list-style-type: none"> <li>- No Tier 3 projects identified.</li> </ul>	This includes other developments which have the potential to affect helicopter access to oil and gas vessels operating in the vicinity of oil and gas infrastructure, leading to the maximum potential impact upon helicopter access to the oil and gas support vessels.
Operation	Cumulative effect of impacts of Hornsea Four helicopter operations on the available airspace for oil and gas related helicopter operations.	<p>Maximum design scenario for Hornsea Four plus the full development of the following projects within 9 nm of Hornsea Four:</p> <p><b>Tier 1:</b></p> <ul style="list-style-type: none"> <li>- Consented project not yet under construction (Hornsea Project Two).</li> <li>- Consented project under construction (Hornsea Project One).</li> </ul> <p><b>Tier 2:</b></p> <ul style="list-style-type: none"> <li>- No Tier 2 projects identified.</li> </ul> <p><b>Tier 3:</b></p> <ul style="list-style-type: none"> <li>- No Tier 3 projects identified.</li> </ul>	This includes the presence of other developments and their helicopter operations which will have the potential to affect the available airspace for oil and gas helicopter operations.
<i>Oil and Gas Operations: Shipping and Navigation Impacts</i>			
Operation	Cumulative effect of interference with the performance of the REWS located on oil and gas platforms.	<p>Maximum design scenario for Hornsea Four plus the full development of the following projects within 35 km of Hornsea Four:</p> <p><b>Tier 1:</b></p> <ul style="list-style-type: none"> <li>- Consented project not yet under construction (Hornsea Project Two).</li> <li>- Consented project under construction (Hornsea Project One).</li> </ul> <p><b>Tier 2:</b></p> <ul style="list-style-type: none"> <li>- No Tier 2 projects identified.</li> </ul> <p><b>Tier 3:</b></p> <ul style="list-style-type: none"> <li>- No Tier 3 projects identified.</li> </ul>	The scenario which has the greatest amount of infrastructure creating the largest area of radar cross section and correspondingly greatest effect on REWS.

Project Phase	Potential Impact	Maximum Design Scenario	Justification
Operation	Cumulative effect of wind turbines and associated infrastructure forming a physical obstruction and may disrupt vessel access to oil and gas platforms and subsurface infrastructure	<p>Maximum design scenario for Hornsea Four plus the full development of the following projects within 9 nm of Hornsea Four:</p> <p><b>Tier 1:</b></p> <ul style="list-style-type: none"> <li>- Consented project not yet under construction (Hornsea Project Two).</li> <li>- Consented project under construction (Hornsea Project One).</li> </ul> <p><b>Tier 2:</b></p> <ul style="list-style-type: none"> <li>- No Tier 2 projects identified.</li> </ul> <p><b>Tier 3:</b></p> <ul style="list-style-type: none"> <li>- No Tier 3 projects identified.</li> </ul>	Development resulting in the greatest reduction in sea room and therefore greatest potential for disruption to vessel operations to individual oil and gas assets.
Operation	Cumulative effect of the presence of new wind turbines in previously open sea areas will deviate vessels which may cause a change in CPA alarms an oil and gas platforms protected by REWS	<p>Maximum design scenario for Hornsea Four plus the full development of the following projects within 35 km of Hornsea Four:</p> <p><b>Tier 1:</b></p> <ul style="list-style-type: none"> <li>- Consented project not yet under construction (Hornsea Project Two).</li> <li>- Consented project under construction (Hornsea Project One).</li> </ul> <p><b>Tier 2:</b></p> <ul style="list-style-type: none"> <li>- No Tier 2 projects identified.</li> </ul> <p><b>Tier 3:</b></p> <ul style="list-style-type: none"> <li>- No Tier 3 projects identified.</li> </ul>	Development which reduces sea room and creates the greatest potential disturbance to shipping routes which may impact safety at oil and gas infrastructure.
Operation	Cumulative effect of potential allision risk to oil and gas platform due to vessels being deviated by Hornsea Four	<p>Maximum design scenario for Hornsea Four plus the full development of the following projects within 35 km of Hornsea Four:</p> <p><b>Tier 1:</b></p> <ul style="list-style-type: none"> <li>- Consented project not yet under construction (Hornsea Project Two).</li> <li>- Consented project under construction (Hornsea Project One).</li> </ul> <p><b>Tier 2:</b></p> <ul style="list-style-type: none"> <li>- No Tier 2 projects identified.</li> </ul> <p><b>Tier 3:</b></p> <ul style="list-style-type: none"> <li>- No Tier 3 projects identified.</li> </ul>	Development which reduces sea room and creates the greatest potential disturbance to shipping routes which may increase allision risk between vessels and oil and gas infrastructure.

Project Phase	Potential Impact	Maximum Design Scenario	Justification
<i>Oil and Gas Operations: General</i>			
Operation	Cumulative effect of potential interference of Hornsea Four turbines and other projects with microwave links disrupting oil and gas communications	Maximum design scenario for Hornsea Four plus the full development of the following projects within 35 km of Hornsea Four: <b>Tier 1:</b> <ul style="list-style-type: none"> <li>- Consented project not yet under construction (Hornsea Project Two).</li> <li>- Consented project under construction (Hornsea Project One).</li> </ul> <b>Tier 2:</b> <ul style="list-style-type: none"> <li>- No Tier 2 projects identified.</li> </ul> <b>Tier 3:</b> <ul style="list-style-type: none"> <li>- No Tier 3 projects identified.</li> </ul>	The scenario which has the greatest amount of infrastructure creating the greatest risk of interfering with microwave links.



## 12.12 Transboundary effects

12.12.1.1 Transboundary effects are defined as those effects upon the receiving environment of other European Economic Area (EEA) states, whether occurring from Hornsea Four alone, or cumulatively with other projects in the wider area. A transboundary screening exercise was undertaken at Scoping (Annex K of the Scoping Report), which identified that there was no potential for significant transboundary effects to occur in relation to Infrastructure and Other Users.

## 12.13 Inter-related effects

12.13.1.1 Inter-related effects consider impacts from the construction, operation or decommissioning of Hornsea Four on the same receptor (or group). A description of the process to identify and assess these effects is presented in [Section 5.8 of Volume 1, Chapter 5: Environmental Impact Assessment Methodology](#). Following the completion of the oil and gas assessment which will be submitted with the final application, an inter-related effects assessment will be undertaken.

## 12.14 Conclusion and summary

12.14.1.1 This chapter has investigated the potential impacts that may arise as a result of the construction, operation and decommissioning of Hornsea Four on Infrastructure and Other Users. Only impacts on oil and gas operators were scoped into the EIA.

12.14.1.2 There are four categories of potential impacts on oil and gas operations which have been considered in this chapter which are described below in [Table 12.19](#).

**Table 12.19: Summary of the proposed impacts to be assessed in final DCO application in relation to Infrastructure and Other Users.**

Category	Potential Impact
Development of the oil and gas industry	Conflicts with oil and gas seismic survey activity within the Hornsea Four array area (IOU-C-6).
	Restriction on oil and gas drilling and the placement of infrastructure within the Hornsea Four array and within 500 m of the boundary at the Hornsea Four array area (IOU-C-7).
	Conflicts with oil and gas seismic activity along the Hornsea Four offshore ECC (IOU-C-8).
	Restriction on oil and gas drilling and the placement of infrastructure within the offshore ECC and within 500 m of the Hornsea Four ECC (IOU-C-9).
	The piling of wind turbines and substation foundations will generate underwater noise that may cause acoustic interference with oil and gas seismic survey operations (IOU-C-10).
	Interference with the performance of the REWS located on oil and gas platforms (IOU-O-16).

Category	Potential Impact
Safe shipping and navigation as required for the operation of the oil and gas industry	The presence of new wind turbines in previously open sea areas will deviate vessels which may cause a change in CPA alarms an oil and gas platforms protected by REWS (IOU-O-18).
	Wind turbines and associated infrastructure will form a physical obstruction and may disrupt vessel access to oil and gas platforms and subsurface infrastructure (IOU-O-17).
	Potential allision risk to oil and gas platforms due to vessels being deviated by Hornsea Four (IOU-O-19).
Safe aviation access to oil and gas infrastructure and vessels	Potential impacts on helicopter access to existing platforms (IOU-O-20).
	Potential impacts on helicopter access to vessels (such as drilling rigs, diving support vessels, seismic vessels, heavy lift crane barges or accommodation units operating in the vicinity of platforms and/or subsea assets) (IOU-O-21).
	Potential impacts of Hornsea Four helicopter operations on the available airspace for oil and gas related helicopter operations (IOU-O-22).
General safe operations of the oil and gas industry:	Potential interference of Hornsea Four turbines with microwave links disrupting oil and gas communications (IOU-O-24).
	The potential impacts of piling at Hornsea Four on the safety of diving operations that may be required at oil and gas assets (IOU-C11).

12.14.1.3 Currently the Applicant is completing a series of further assessments in response to the consultation completed with relevant operators. These studies will be incorporated into an oil and gas assessment that will accompany the final DCO application as described in this PEIR. The scope and approach to the oil and gas assessment will be developed in consultation with relevant oil and gas operators and with due regard to the specific characteristics of their operations and assets.

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