



# Hornsea Project Four

## Habitats Regulations Assessment Compensation Measures Part 1-2

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## Revision Summary

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## Revision Change Log

<i>Rev</i>	<i>Page</i>	<i>Section</i>	<i>Description</i>
01	-	-	Submitted at Application
02	186 and 191	7.1 and 7.2	Updated based on the most recent designated site information for Scilly Complex SAC, and inclusion of potential impact on grey seal.
02	9	1.1	Position on kittiwake AEoI conclusion
02	244	Appendix B	Updated features of Isles of Scilly SAC
02	158-167 and 170-183	5.1 and 5.2	Updates to Tables 11, 12 and 14 on the potential impacts from the footprint of the artificial nesting structure.
03	Updated throughout	Updated throughout	Updated based on the most recent compensation proposal details, including updates on the refinement of the compensation measures following submission of the DCO Application and removal of reference to gannet. Tables 6, 9, and 13 have been updated due to specific designated site no longer being of relevance following further refinement of compensation measures Areas of Search. For the same reason, a number of tables from the previous version ( <b>REP5-014</b> ) (Tables 12, 15, 16, 17 & 20) have been removed as the designated sites they focused on were no longer relevant.

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## Glossary

Term	Definition
Areas of Search	A term used to identify the locations for each of the proposed primary Compensation Measures.
Commitment	A term used interchangeably with mitigation and enhancement measures. The purpose of Commitments is to reduce and/or eliminate Likely Significant Effects (LSEs), in EIA terms. Primary (Design) or Tertiary (Inherent) are both embedded within the assessment at the relevant point in the EIA (e.g. at Scoping, Preliminary Environmental Information Report (PEIR) or ES). Secondary commitments are incorporated to reduce LSE to environmentally acceptable levels following initial assessment i.e. so that residual effects are acceptable.
Compensation Commitment Register	An Excel spreadsheet which identifies all of the commitments identified for consideration when assessing/ implementing the proposed compensation measures. The compensation commitments relate to both onshore and offshore, and includes the construction, operation and decommissioning phases of development for the proposed Compensation Measures. Document reference: <a href="#">A4.6.4: Compensation Commitments Register</a> .
Compensation Impacts Register	An Excel spreadsheet which identifies all of the potential effects that the project team have identified that could possibly result from the construction, operation and decommissioning of the considered compensation measures for Hornsea Four, relating to each technical topic under consideration in the EIA process. Document reference: <a href="#">A4.6.3 Compensation Impacts Register</a> .
Compensation Measures	The measures that have been developed by the Applicant pursuant to the HRA Derogation Provisions ‘without prejudice’ to the Applicants position of no Adverse Effect on Site Integrity at the Flamborough and Filey Coast in respect of the qualifying features. The Compensation Measures are: repurposed offshore artificial nesting platforms, new offshore artificial nesting platforms, new onshore artificial nesting platforms; bycatch reduction technology, and predator eradication. Each alone is a Compensation Measure and together are referred to as the Compensation Measures.
Cumulative effects	The combined effect of Hornsea Four in combination with the effects from a number of different projects, on the same single receptor/resource. Cumulative impacts are those that result from changes caused by other past, present or reasonably foreseeable actions together with Hornsea Project Four.
Design Envelope	A description of the range of possible elements that make up the Hornsea Project Four design options under consideration, as set out in detail in the project description. This envelope is used to define Hornsea Project Four for Environmental Impact Assessment (EIA) purposes when the exact engineering parameters are not yet known. This is also often referred to as the “Rochdale Envelope” approach.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Projects (NSIP).

Term	Definition
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 value, 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.
Environmental Statement (ES)	A document reporting the findings of the EIA and produced in accordance with the EIA Directive as transposed into UK law by the EIA Regulations.
High Voltage Alternating Current (HVAC)	High voltage direct current is the bulk transmission of electricity by alternating current (AC), whereby the flow of electric charge periodically reverses direction.
Hornsea Project Four Offshore Wind Farm	The term covers all elements of the project (i.e. both the offshore and onshore). Hornsea Four infrastructure will include offshore generating stations (wind turbines), electrical export cables to landfall, and connection to the electricity transmission network. Hereafter referred to as Hornsea Four.
Landfall	The generic term applied to the entire landfall area between Mean Low Water Spring (MLWS) tide and the Transition Joint Bay (TJB) inclusive of all construction works, including the offshore and onshore ECC, intertidal working area and landfall compound. Where the offshore cables come ashore east of Fraisthorpe.
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.
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 or ES).
National Grid Electricity Transmission (NGET) substation	The grid connection location for Hornsea Four.
Order Limits	The limits within which Hornsea Project Four (the 'authorised project') may be carried out.
Orsted Hornsea Project Four Ltd.	The Applicant for the proposed Hornsea Project Four Offshore Wind Farm Development Consent Order (DCO).
Planning Inspectorate (PINS)	The agency responsible for operating the planning process for Nationally Significant Infrastructure Projects (NSIPs).
Resilience Measures	The measure designed to support the ecological system and increase the resilience of the compensation measures. As proposed by the Applicant pursuant to the HRA Derogation Provisions 'without prejudice' to the Applicants position of no Adverse Effect on Site Integrity at the Flamborough and Filey Coast in respect of the qualifying features. The Compensation Measure considered is fish habitat enhancement (seagrass).

## Acronyms

Term	Definition
AA	Appropriate Assessment
AEol	Adverse Effect on Integrity
AfL	Agreement for Lease
AoS	Area of Search
AEol	Adverse Effect on Integrity
AWD	Above Water Deterrents
BEIS	Department for Business, Energy and Industrial Strategy
CBRA	Cable Burial Risk Assessment
DCO	Development Consent Order
DBCBC	Dogger Bank Creyke Beck
DP	Dynamic Positioning
ECC	Export Cable Corridor
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
ES	Environmental Statement
FFC	Flamborough and Filey Coast
HRA	Habitats Regulations Assessment
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
JNCC	Joint Nature Conservation Committee
JUV	Jack-Up Vessel
LAT	Lowest Astronomical Tide
LED	Light Emitting Diode
LSE	Likely Significant Effect
MBES	Multi-Beam Echo Sounder
MCZ	Marine Conservation Zone
MDS	Maximum Design Scenario
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MPA	Marine Protected Area
NFFO	National Federation of Fisherman's Organisations
OOEG	Hornsea Four Offshore Ornithology Engagement Group
PEIR	Preliminary Environmental Information Report
PINS	The Planning Inspectorate
PSA	Particle Size Analysis
RIAA	Report to Inform Appropriate Assessment
RSBP	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SoS	Secretary of State
SSS	Side-Scan Sonar
TCE	The Crown Estate
TCPA	Town and Country Planning Act

Term	Definition
UKHO	UK Hydrographic Office
UXO	Unexploded Ordnance
WFD	Water Framework Directive

## Units

Unit	Definition
dB	Decibel (sound pressure)
Hz	Hertz (frequency)
Km	Kilometer (distance)
Km <sup>2</sup>	Kilometer squared (distance)
M	Meter (distance)
M <sup>2</sup>	Meter squared (distance)

## 1 Introduction

### 1.1 Project Background

- 1.1.1.1 Orsted Hornsea Project Four Limited (hereafter the 'Applicant') is proposing to develop Hornsea Project Four Offshore Wind Farm (hereafter 'Hornsea Four'). Hornsea Four will be located approximately 69 km offshore the East Riding of Yorkshire in the Southern North Sea and will be the fourth project to be developed in the former 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. Detailed information on the project design can be found in [A1.4: Project Description \(REP6-003\)](#), with detailed information on the site selection process and consideration of alternatives described in [A1.3: Site Selection and Consideration of Alternatives \(APP-009\)](#).
- 1.1.1.2 The Hornsea Four Agreement for Lease (AfL) area was 846 km<sup>2</sup> at the Scoping phase of project development. In the spirit of keeping with Hornsea Four's approach to Proportionate Environmental Impact Assessment (EIA), the project has given due consideration to the size and location (within the existing AfL area) of the final project that is being taken forward to Development Consent Order (DCO) application. This consideration is captured internally as the "Developable Area Process", which includes Physical, Biological and Human constraints in refining the developable area, balancing consenting and commercial considerations with technical feasibility for construction.
- 1.1.1.3 The combination of Hornsea Four's Proportionality in EIA and Developable Area Process has resulted in a marked reduction in the array area taken forward at the point of DCO application. Hornsea Four adopted a major site reduction from the array area presented at Scoping (846 km<sup>2</sup>) to the Preliminary Environmental Information Report (PEIR) boundary (600 km<sup>2</sup>), with a further reduction adopted for the Environmental Statement (ES) and DCO application (468 km<sup>2</sup>) due to the results of the PEIR, technical considerations and stakeholder feedback. The evolution of the Hornsea Four Order Limits is detailed in [A1.3: Site Selection and Consideration of Alternatives \(APP-009\)](#) and [A4.3.2: Selection and Refinement of the Offshore Infrastructure \(APP-037\)](#).
- 1.1.1.4 The Applicant submitted a DCO application to the Planning Inspectorate (PINS), supported by a range of plans and documents including an ES which sets out the results of the EIA of Hornsea Four and its associated infrastructure. The Applicant also submitted a Report to Inform Appropriate Assessment (RIAA) ([B2.2: Report to Inform Appropriate Assessment \(REP5-012, REP2-005, AS-013, REP1-012 and APP-171 – APP-178\)](#)) which sets out the information necessary for the competent authority (the Secretary of State (SoS) for the Department for Business, Energy & Industrial Strategy (BEIS)) to undertake an Appropriate Assessment (AA) to determine if there is any Adverse Effect on Integrity (AEol) on the national site network as a result of the development of Hornsea Four (alone and or in-combination). Should the conclusion of that AA be AEol (or there is uncertainty around this), that would raise the requirement for the Applicant to consider subsequent stages of the Habitats Regulation Assessment (HRA) process (typically referred to as the derogations), which brings a requirement, among other considerations, to secure compensatory measures.
- 1.1.1.5 In accordance with the Habitats Regulations, the RIAA ([B2.2: Report to Inform Appropriate Assessment \(REP5-013, REP2-005, AS-013, REP1-012 and APP-171 – APP-178\)](#)) considers



whether Hornsea Four could result in an AEol on a conservation site of European importance (European site). The Applicant's RIAA concluded that Hornsea Four will potentially have an AEol, in combination, on the kittiwake feature of the Flamborough and Filey Coast (FFC) SPA. No AEol was concluded for all other European site features.

- 1.1.1.6 It is material to note that in granting consent for Hornsea Three, the SoS<sup>1</sup> did so in light of a conclusion of adverse effect with respect to three designated sites; of these three sites the Flamborough and Filey Coast (FFC) Special Protection Area (SPA) is also a material consideration for Hornsea Four. Further, during the consideration of the DCO application for Hornsea Three Offshore Wind Farm (Hornsea Three), the SoS clarified the importance of i) identifying the potential for AEol of designated sites during the pre-application period and ii) considering the need for derogation of the Habitats Regulations during examination, where there is potential for AEol. The SoS further expected Applicants and Statutory Nature Conservation Bodies (SNCBs) to engage constructively during the pre-application period and on these matters, including possible compensatory measures, for consideration during examination. The SoS was clear that this does not require that an agreement is reached between the Applicant and the SNCBs on the potential for significant adverse impacts on designated sites, and that evidence relating to derogation can be provided on a 'without prejudice' basis, as the final decision on such matters remains with the SoS.
- 1.1.1.7 As such, the Applicant is proposing a suite of Compensation Measures that could be implemented in the event that the SoS concludes that there would be an AEol on the FFC SPA as a result of Hornsea Four. These Compensation Measures are set out in a 'without prejudice' Derogation Case which forms part of the DCO Application (**B2.5: Without Prejudice HRA Derogation Case (REP1-014)**). The Compensation Measures are proposed 'without prejudice' to the Applicant's RIAA conclusion of no AEol in relation to, guillemot and razorbill features of the FFC SPA. Compensation measures for kittiwake are not presented 'without prejudice' based on the AEol conclusion for the species.
- 1.1.1.8 The potential Compensation Measures are set out in **Table 1** with further details on the measures set out in **B2.5: Without Prejudice HRA Derogation Case (REP1-014)**. It is anticipated that for razorbill and guillemot, a package of measures could be required, rather than a single compensation measure. The Compensation Measures are proposed to be located in numerous areas of the UK and beyond (see **Figure 1** for the Areas of Search (AoS)).

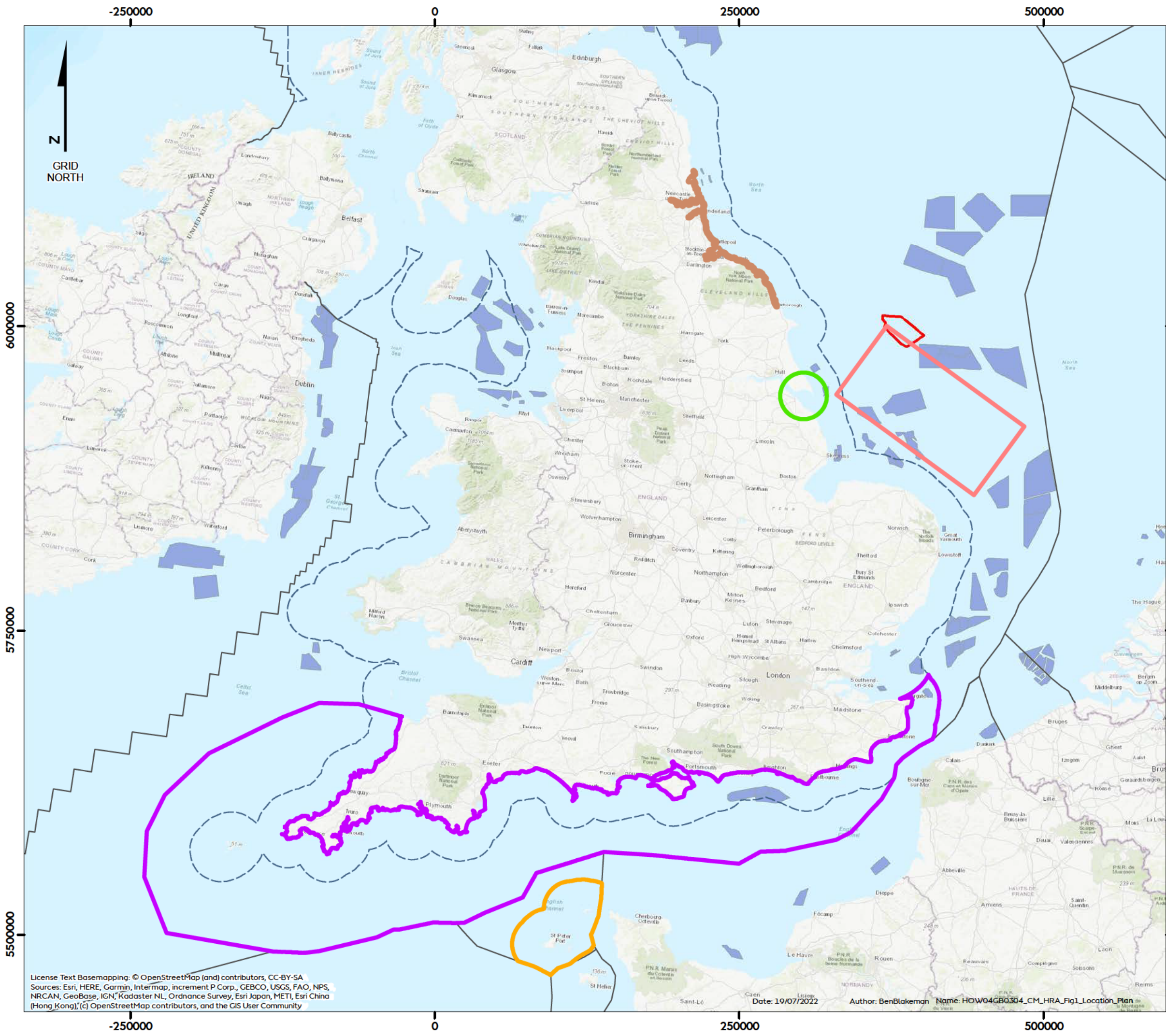
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<sup>1</sup> <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-003265-EN010080%20Hornsea%20Three%20-%20Secretary%20of%20State%20Decision%20Letter.pdf>

**Table 1: Potential ‘without prejudice’ Compensation Measures for Hornsea Four.**

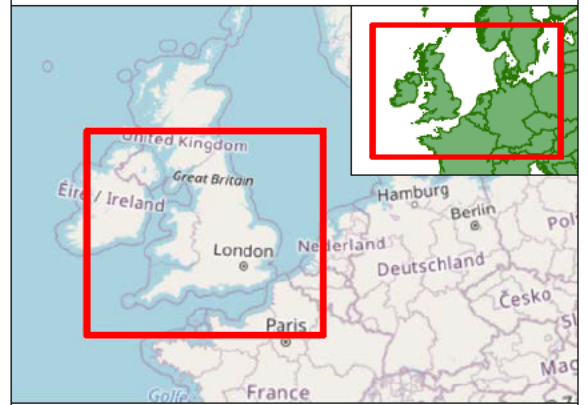
Compensation Measure	Option	Location	Location ID	Kittiwake	Guillemot	Razorbill
Offshore nesting	New	Southern North Sea (Area of Highest Ecological Potential)	A1			
Offshore nesting	Repurposed	Southern North Sea (Wenlock platform)	A1			
Onshore nesting	New	Cayton Bay to Newbiggin by the Sea	B1			
Bycatch	-	South coast of England	C1			
Predator eradication	-	Bailiwick of Guernsey	D1			
Fish Habitat Enhancement	-	Humber Estuary	E1			





**Hornsea Four**  
Figure 1  
Compensation Measures Area of Search Location Plan

- Array Area
- UK 12M Limit
- Economic Exclusion Zone Boundary
- Offshore Wind Farm
- Compensation Measures Areas of Search
- Offshore Nesting Area of Search
- Onshore Nesting Area of Search
- Bycatch Area of Search
- Predator Eradication Area of Search
- Seagrass Area of Search



Coordinate system: ETRS 1989 UTM Zone 31N  
Scale@A3: 1:3,000,000

0 50 100 Kilometres

0 25 50 Nautical Miles

REV	REMARK	DATE
—	First Issue	07/09/2021
A	Second Issue - Refined Search Areas	14/07/2022

Compensation Measures Location Plan  
Document no: HOW04GB0304  
Created by: BPHB  
Checked by: GG  
Approved by: LK



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Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community



## 1.2 Purpose of this Document

- 1.2.1.1 In order to consider the environmental impacts associated with the implementation of the proposed Compensation Measures, an Annex to the Hornsea Four ES has been produced (hereafter 'the Compensation Measures EIA' – Revision 2 of [A4.6.5: Compensation EIA Annex](#) (submitted at Deadline 7)), with this document (hereafter 'the Compensation Measures HRA') also being produced in relation to the Compensation Measures. This document includes both Screening and information to inform AA, to provide the information necessary for HRA.
- 1.2.1.2 This document has been produced to inform the HRA process for the Compensation Measures. It provides information to enable the screening of each of the Compensation Measures with respect to their potential to have a likely significant effect (LSE) on European and Ramsar sites of nature conservation importance. Where potential for LSE is identified (or cannot be discounted), determination of the potential for an adverse effect on integrity (AEoI) is made in light of appropriate mitigation measures.
- 1.2.1.3 The assessment provided in this document is based on the current understanding of the location, scope and nature of the proposed Compensation Measures. It should be noted, however, that ultimately, the Compensation Measures will not be consented through the Hornsea Four DCO application process and will be subject to (where necessary) standalone EIA and HRA processes as part of their own consenting process (for example a Marine Licence application and/or Planning Application). As part of that consenting process, further assessment work will be undertaken, based on refined design and methodology details.

## 1.3 Structure of this Document

- 1.3.1.1 This Compensation Measures HRA is set out in a number of stages as follows:
- Consultation ([Section 1.4](#));
  - The Maximum Design Scenario for the potential Compensation Measures for Hornsea Four ([Section 1.5](#));
  - A brief summary of the Habitats Regulations Assessment Process ([Section 2](#));
  - Identification of potential effects ([Section 2.3.2](#));
  - An HRA section for each Compensation Measure ([Sections 3 to 6](#)), with each section containing the following sections:
    - Screening - an assessment of the potential for LSE to arise for the project alone with regard to the designated features of the European sites under consideration;
    - Information to Inform Appropriate Assessment where screening has identified potential for LSE.
  - Conclusions ([Section 8](#)); and
  - References ([Section 10](#)).
- 1.3.1.2 Detail on the need for the compensation measures and alternatives considered to date is provided in [B2.5: Without Prejudice HRA Derogation Case \(REP1-014\)](#). As part of this, it is noted that the AoS under consideration remain broad in terms of location and extent; this is necessary at this stage to ensure all options are considered and the most appropriate identified. It is expected that the AoS will be subsequently refined should the derogation case be required to progress as a condition of the award of the Hornsea Four DCO.

## 1.4 Consultation

- 1.4.1.1 The Applicant has undertaken extensive consultation with relevant stakeholders as part of the preparation of the 'without prejudice' Derogation Case (namely, Natural England, Joint Nature Conservation Committee (JNCC), the Royal Society for the Protection of Birds (RSPB), the Marine Management Organisation (MMO), PINS, Defra, Local Planning Authorities, The Wildlife Trusts, the National Federation of Fisherman's Organisations (NFFO) and relevant local organisations with key knowledge) regarding compensation for Hornsea Four. Relevant stakeholders will be engaged through the Hornsea Four Offshore Ornithology Engagement Group (OOEG). Further detail on this consultation is presented in the Record of Consultation ([B2.9: Record of Consultation \(APP-201\)](#)). Consultation will be ongoing with various stakeholders for all proposed compensation measures at various stages through the Examination process and beyond.
- 1.4.1.2 The Applicant has undertaken some consultation specifically in relation to the Compensation Measures with statutory consultees who may have an interest in the proposed Compensation Measures, and certain stakeholders located in the vicinity of the land potentially affected by the measures. This targeted consultation ran from 5<sup>th</sup> August to 6<sup>th</sup> September 2021. All responses and comments are presented in Volume A1, Annex 1.37 Non-Statutory Targeted Compensation Measures Consultation Responses alongside the regard the Applicant has had to these consultation responses.

## 1.5 Project Description

### 1.5.1 Introduction

- 1.5.1.1 The project description is presented for each Compensation Measure as a Maximum Design Scenario (MDS), in line with the approach taken in the ES and the RIAA. This approach ensures that the scenario(s) that would have the greatest impact, relevant to the AoS and the Compensation Measure under consideration, is identified and assessed. As a result, we can be confident that any other (lesser) scenario(s) will have an impact that is no greater than that assessed.
- 1.5.1.2 The following sections ([Section 2.3.3 to 2.3.6](#)) therefore provide a description of the design and methodologies related to each of the proposed Compensation Measures referenced in [Table 1](#) and summarised below, presented as a MDS. These descriptions set out the design and components for any infrastructure, as well as the activities associated with the installation/ construction, implementation/ operation/ maintenance, and decommissioning of each Compensation Measure (where relevant). Further details on these measures can be found in Revision 2 of [A4.6.1: Compensation Project Description](#) (Deadline 7 submission) The Compensation Measures are as follows:
- Offshore Artificial Nesting Structure (New and Repurposed);
  - New Onshore Artificial Nesting Structure;
  - Bycatch Reduction Technology;
  - Predator Eradication; and
  - Resilience Measure – Fish Habitat Enhancement (Seagrass).



## 1.5.2 Areas of Search

1.5.2.1 As noted above, AoS have been identified for each Compensation Measure, with these shown in [Figure 1](#). These AoS range from small areas around islands or discrete sections of coastline, to larger areas spanning large areas of sea and coastlines. These have been identified and the AoS identification process is detailed for each compensation measure in Revision 2 of [A4.6.1: Compensation Project Description](#) (Deadline 7 submissions). Information on the consultation undertaken as part of the process to date is presented within [B2.9 Record of Consultation \(APP-201\)](#). As noted above, the extent of the AoS remains broad but will be refined as the process progresses. The individual AoS for each Compensation Measure are shown in figures following each MDS.

## 1.5.3 Compensation Measures Commitments

1.5.3.1 All Commitments relevant to the Compensation Measures HRA are detailed in Revision 2 of [A4.6.4: Compensation Commitments Register](#) (Deadline 7 submission). Commitments are not taken into account during the consideration of potential LSE; however Commitments are a consideration during the determination of potential for AEol.

## 1.5.4 Compensation Measures Programme

1.5.4.1 The high-level, indicative, programme presented below is applicable to the implementation and delivery of all Compensation Measures (with Compensation Measures to commence prior to construction of Hornsea Four):

- Hornsea Four development consent determination – 2022/23;
- Compensation implementation licencing – 2022/24;
- Compensation implementation – 2023/24;
- Offshore construction of Hornsea Four Foundations– 2026;
- Offshore construction of Hornsea Four Turbines– 2027; and
- First Power (partially operational windfarm) – 2028.

1.5.4.2 The requirement for, and the exact nature of, the decommissioning of the Compensation Measures will be determined in consultation with the relevant authorities towards the end of the 35-year operational life of Hornsea Four. The Applicant will design the bird nesting structure for a design life equal to that of the windfarm (i.e. 35 years plus 4 years to establish the compensation measures, pre-wind farm operation). Therefore, the lifetime of the structure is approximately 39 years). In the final few years of wind farm operation, the Applicant will commence inspections and surveys of the bird nesting structures to determine if an extension of the lifetime is possible.

1.5.4.3 It is currently anticipated that both the predator eradication and bycatch measures implementation will result in new management practices which shall continue for the lifetime of Hornsea Four. Fish habitat enhancement (seagrass) compensation measure sites will be left in perpetuity.

## 1.5.5 Offshore Artificial Nesting Structure (New and Repurposed)

1.5.5.1 The provision of a new or repurposed artificial nesting site is presented as a potential Compensation Measure for the black-legged kittiwake (*Rissa trydactyla*) (referenced

throughout as kittiwake) ([Table 1](#)).

- 1.5.5.2 Kittiwake have been observed readily (APEM 2021 and NIRAS 2021) utilising man-made structures. As such, the provision of an offshore artificial nest site to increase the annual recruitment of kittiwake into the regional population of the southern North Sea. This is considered a potential primary Compensation Measure relating to in-combination collision effects during the operation and maintenance phase of Hornsea Four on the kittiwake population designated at the FFC SPA. The aim of the Compensation Measure is to provide one structure that can collectively sustain a breeding population of kittiwake pairs, which would produce sufficient breeding adults to compensate for the estimated impact of Hornsea Four.
- 1.5.5.3 The Applicant is considering two options by which to achieve this:
- Repurposing an existing oil and gas platform (Wenlock Platform) that is due for decommissioning (preferred); or
  - Construction of a new offshore nesting structure (within the Area of Highest Ecological Potential).
- 1.5.5.4 The Area of Search for an offshore artificial nesting structure (new and repurposed structures) is shown in [Figure 2](#) and set out within the Revision 5 of [B2.7.2 Compensation measures for Flamborough and Filey Coast \(FFC\) Special Protection Area \(SPA\): Kittiwake Offshore Artificial Nesting Roadmap](#) (Deadline 7 submission). The site selection process for these offshore structures is outlined in the Derogation Case (specifically [B2.7.5 Compensation measures for FFC SPA: Artificial Nesting: Site Selection and Design \(APP-191\)](#)). The purpose of the site selection process has been to identify an area, or existing structure (e.g., an oil and gas platform), to host an artificial nesting structure that will be occupied by new recruits that will contribute to an increase of breeding adults to the Southern North Sea kittiwake population. The principles influencing optimal site selection include:
- Locations with connectivity to the Eastern Atlantic kittiwake population – based within the North Sea;
  - Locations with proximity to reliable food resources – close to sea fronts (e.g. southern North Sea); and
  - Locations with proximity to growing kittiwake colonies – near to known offshore sites with colonies of kittiwake (e.g., southern North Sea oil and gas platforms).
- 1.5.5.5 Ongoing consultation will involve conservation and ornithological groups with local knowledge and expertise. Updates on progress on the site selection are presented within the Revision 5 of [B2.7.2 Compensation measures for Flamborough and Filey Coast \(FFC\) Special Protection Area \(SPA\): Kittiwake Offshore Artificial Nesting Roadmap](#) (Deadline 7 submission). Post-consent, a steering group named the Offshore Ornithology Engagement Group (OOEG) would be convened by the Applicant to consult on the implementation, reporting and any necessary adaptive management of the structure as determined by the Applicant. The OOEG will aim to incorporate relevant stakeholders and ultimately inform the Kittiwake Compensation Implementation and Monitoring Plan (KCIMP).

New offshore artificial nesting structure

1.5.5.6 For the purpose of the assessment, a maximum design scenario of one new offshore artificial nesting structure is considered, to be installed on one of the following foundation types, noting that the requirement for a new offshore structure, the location and the exact foundation type are yet to be determined:

- Monopile;
- Mono-suction bucket;
- Gravity based foundation;
- Piled jacket; or
- Suction bucket jacket.

1.5.5.7 The overall design of a topside nesting structure is flexible, as long as suitable narrow nesting ledges are present. A summary of the key features an offshore platform for nesting might include is provided below:

- High and steep sided structure, narrow horizontal ledge for nests, small overhang above nest;
- Inaccessible to predators, which offshore would primarily be large gulls;
- Some shelter from high winds and other adverse weather conditions; and
- May include a shelter and potentially CCTV to enable monitoring of the seabirds.

1.5.5.8 The new offshore artificial nesting structure will likely be installed in two stages, firstly the foundation will be installed, and secondly the topside will be lifted from a jack -up vessel (JUV) onto the foundation. Some form of seabed preparation (boulder and sandwave clearance), unexploded ordnance (UXO) clearance and scour protection may be required for the foundations.

1.5.5.9 The maximum design scenario parameters for a new offshore nesting structure is presented below in [Table 2](#).

**Table 2: Maximum design parameters for a new offshore nesting platform.**

Parameter	Maximum design parameter
Number of offshore nesting platforms	1
Topside structure length (m)	25
Topside structure width (m)	25
Topside structure height (m above LAT)	20
Topside thickness (from topside to upper level of foundation) (m)	10

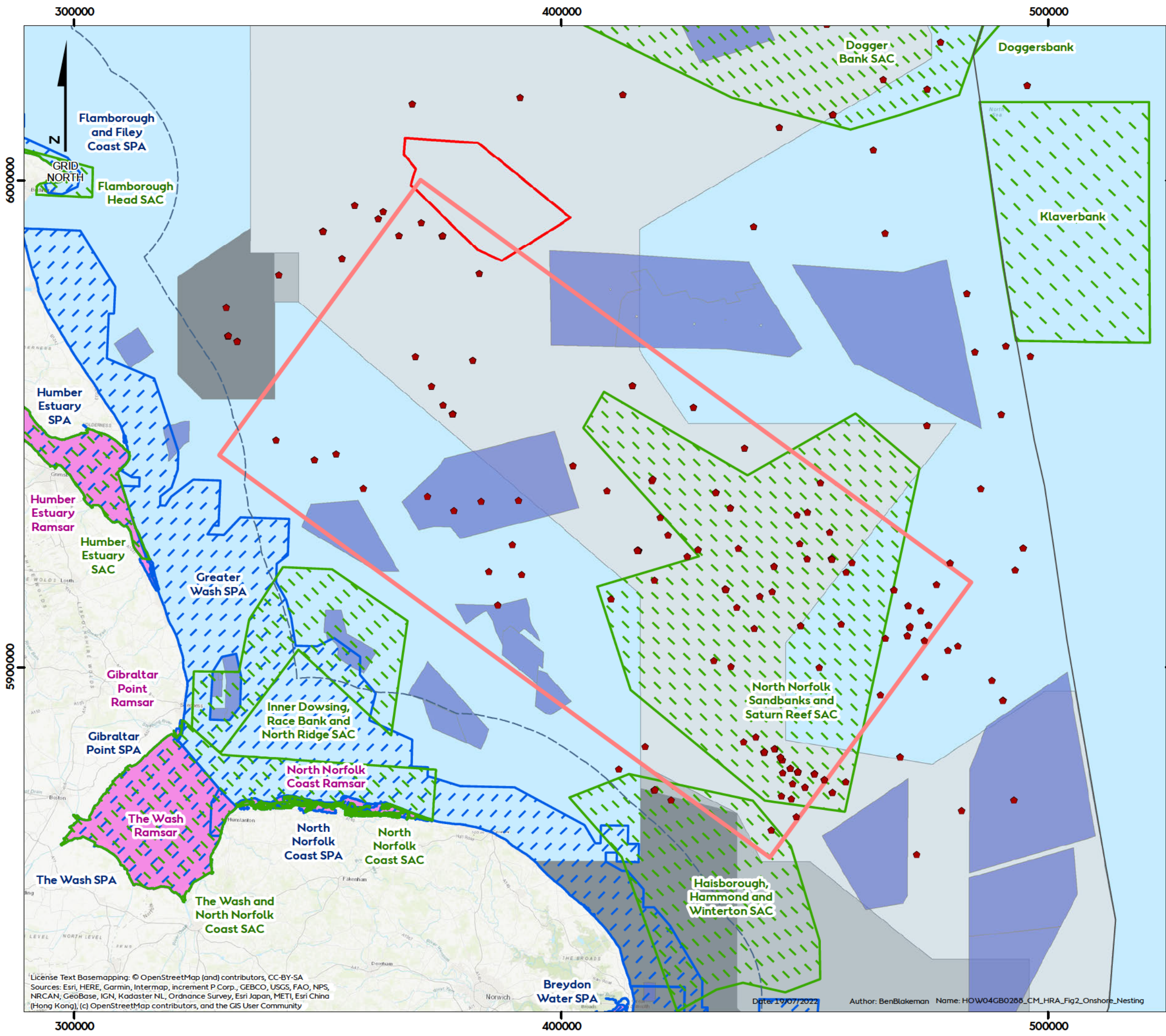
NOTE: Foundation dimensions are dependent on topside dimensions. Which in turn are dependent upon the design of the final topside, which is dependent upon the number of kittiwakes to be compensated.

1.5.5.10 Full details regarding the potential development can be found in Revision 2 of [A4.6.1: Compensation Project Description](#) (Deadline 7 submission).

## Repurposed offshore artificial nesting structure

- 1.5.5.11 The Applicant could utilise a single existing offshore platform (potentially an existing oil and gas structure or similar), and use the foundation to either design, construct and install a new topside once the existing topside structure has been removed and decommissioned or repurpose the existing topside structure by adding additional nesting ledges.
- 1.5.5.12 The topside of the repurposes structure will be up to 19 m above LAT, up to 16 m long, and 13 m wide. The topside design will follow the same principles as outlined in [paragraph 1.5.5.7](#).
- 1.5.5.13 Foundation installation is not required if repurposing an existing offshore platform. However minor modifications to the existing offshore platform foundation may be required. Foundation repurposing installation activities could include repairs, modifications, or reinforcement of existing foundation infrastructure. All modifications would be undertaken using either or a combination of Dynamic Positioning (DP) and JUV vessels.

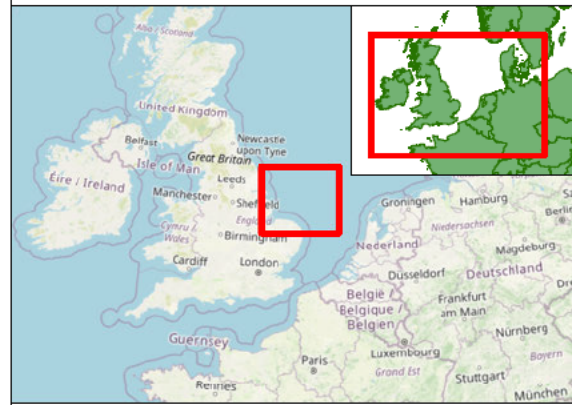




# Hornsea Four

Figure 2  
 Compensation Measures  
 Areas of Search  
 Offshore Nesting  
 Southern North Sea

- Array Area
- Offshore Nesting Area of Search
- UK 12M Limit
- Economic Exclusion Zone Boundary
- Offshore Wind Farm
- Oil and Gas Platforms
- Special Area of Conservation
- Special Protection Area
- Ramsar Site
- Southern North Sea SAC
- Summer Area
- Summer and Winter Area
- Winter Area



Coordinate system: ETRS 1989 UTM Zone 31N  
 Scale@A3: 1:750,000

0 20 40 Kilometres

0 10 20 Nautical Miles

REV	REMARK	DATE
—	First Issue	23/08/2021
A	Second Issue - Refined Search Areas	14/07/2022

Compensation Measures  
 Areas of Search  
 Document no: HOW04GB0288  
 Created by: BPHB  
 Checked by: GG  
 Approved by: LK



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## 1.5.6 New Onshore Artificial Nesting Structure

1.5.6.1 The Applicant is proposing an onshore artificial nesting structure for kittiwake if during Examination, the Secretary of State considers that an alternative (alternative to a preferred repurposed or new offshore nesting) measure is required to the proposed primary measures outlined in Section 4.1.3. The approach to site selection and design are primarily driven by ecological/habitat requirements of the ornithology interests to increase the likelihood of colonisation and ensure the success of the structure. The onshore artificial nesting structure will be located within the Cayton Bay to Newbiggin by the Sea Area of Search (B1). An overview and update on onshore artificial nesting site selection is provided at [G6.3 Kittiwake Onshore Artificial nesting Structure Site Selection and Evidence on Nesting Limitations update \(REP6-031\)](#). The Areas of Search for onshore artificial nesting structures (both new and repurposed structures) is shown in [Figure 3](#).

1.5.6.2 The structure will be designed to accommodate the level of compensation required for kittiwake and will accord with the design principles and indicative maximum parameters set out below.

1.5.6.3 The design principles for the onshore artificial nesting structure are subject to significant further development; however, design principles of direct relevance to the size or appearance of the structure are as follows:

- Steep sided with a near vertical back wall and narrow horizontal ledges;
- Located close to water, facing out to sea (i.e. nest adjacent to/above harbour waters/sea);
- Inaccessible to predators (additional anti-predation features may be required at some sites – e.g. fences/ barriers to deter mammalian predators (e.g. foxes and rats) and dependent on design bird spikes may be required as avian predator deterrents);
- Nesting ledges located above the level of highest astronomical tide and beyond the reach of wave or tidal action;
- Adequate ledge dimensions: Horizontal ledges 20 cm width; length per pair from 30 cm (working length 40 cm); and height between ledges at a minimum of 40 cm and maximum of 60cm. (Note these may be subject to change based on feedback from the stakeholders during detailed design);
- Minimum height at which the lowest shelves should begin depends whether the structure is located directly over water or set back slightly, as well as the level of human disturbance anticipated;
- Overhang/roof to buffer against weather conditions as to act as and additional predator deterrents;
- Vertical wall leaning slightly forward (working angle of 5°; to minimise lower ledges becoming fouled by droppings and reduce predation risk);
- Using materials which are in-keeping with the structure's surroundings whilst ensuring they meet the requirements of kittiwake's natural habitat as much as possible; and
- Higher ledges could be wider than lower ledges (to prevent lower ledges becoming fouled by droppings) (BTO Field Guide No. 23, du Feu (2015)). However, wider upper ledges may increase predation risk/ allow non target species to nest.

## Construction

1.5.6.4 The construction of the onshore artificial nesting structure depends on whether the structure comprises a building, or prefabricated structure (dependant on monitoring and access requirements for tagging). Building construction works, are anticipated to comprise:

- Site preparation works, including vegetation clearance (if required), erection of site fencing and small-scale enabling works;
- Establishment of a site compound and temporary site infrastructure, including a site cabin and welfare facilities;
- Delivery of construction materials and equipment;
- Installation of necessary foundations (to be confirmed, dependant on detailed design and site location); and
- Construction of the nesting structure on-site, methodology of which is dependent on the materials to be used (to be agreed as part of detailed design). Materials used for the building may comprise concrete, wood, or metal).

1.5.6.5 Prefabricated structure construction works are anticipated to comprise:

- Site preparation works, including vegetation clearance (if required), erection of site fencing and small-scale enabling works;
- Establishment of a site compound and temporary site infrastructure, including a site cabin and welfare facilities;
- Delivery of pre-fabricated components of the nesting structure and equipment;
- Installation of necessary foundations (to be confirmed, dependant on detailed design and site location); and
- Assembly and Installation of the nesting structure on-site, methodology of which is dependent on the materials to be used (to be agreed as part of detailed design). Materials used for the pre-fabricated structure may comprise wood or metal.

1.5.6.6 Construction is anticipated to comprise a maximum of 10 AADT HGV movements (subject to detailed design). The site may require a temporary construction access track (dependant on site location), using crushed aggregate on geo-textile, soil stabilisation or temporary trackway. The access track will be 10 m wide, comprising 6m wide road (with 7 m wide passing places) and additional width for topsoil storage. The maximum depth of the access track would be 1 m.

1.5.6.7 A temporary logistics compound may be required and the dimensions of which would be approximately 70x70 m.

## Operation

1.5.6.8 Once the construction of the onshore artificial nesting structure is complete, the site will be secured using fencing and the structure will be operational. Whilst operational activities are under development, [Table 3](#) outlines some design principles that may be of relevance, dependant on stakeholder input and detailed design consideration.

**Table 3 Onshore nesting structure design principles.**

Importance	Principle Description
Optimising monitoring	Capacity for remote monitoring devices e.g. cameras to be fitted to the structure. Ideally these would need to provide coverage of all available ledges at a sufficiently high resolution to monitor individual nests and their contents e.g., chicks and eggs, to be inspected.
Optimising monitoring / essential at some sites	Complex monitoring features to include: <ul style="list-style-type: none"> <li>• Internal access;</li> <li>• Enclosed structures where the personnel monitoring within would be hidden from view, including to birds flying above and therefore minimising any disturbance;</li> <li>• Either with hatches to allow access from behind/within the structure to individual nests by suitably qualified ornithologists undertaking monitoring works;</li> <li>• And / or one-way glass to allow observations to be made from interior/back of structure;</li> <li>• Capacity for additional monitoring equipment to be accommodated within/on the structure (nice to have, not essential); and</li> <li>• Sanitation facilities (requirement to be determined).</li> </ul>
Desirable (a, d) Optimising success (b, c, e)	Capacity for the structure to be modified to facilitate adaptive management design features after they have been operational for some time and if required. These may include: <ul style="list-style-type: none"> <li>• Extension of structure to facilitate further nesting spaces. This would require either sufficient space to expand (laterally or vertically) or designed-in expansion points – for example a modular structure which can be extended;</li> <li>• Relocation of nesting structure. This would require straightforward assembly of components and potential to disassemble, balanced against longevity and stability of the structure;</li> <li>• Additional protection from elements e.g. wind/weather shield location points;</li> <li>• Enhanced predator deterrent e.g. straightforward roof and fencing maintenance, including opportunities to add avian predator deterrents; and</li> <li>• Provision of nesting material, such as seaweed. This would require additional protected space around or under the structure.</li> </ul>

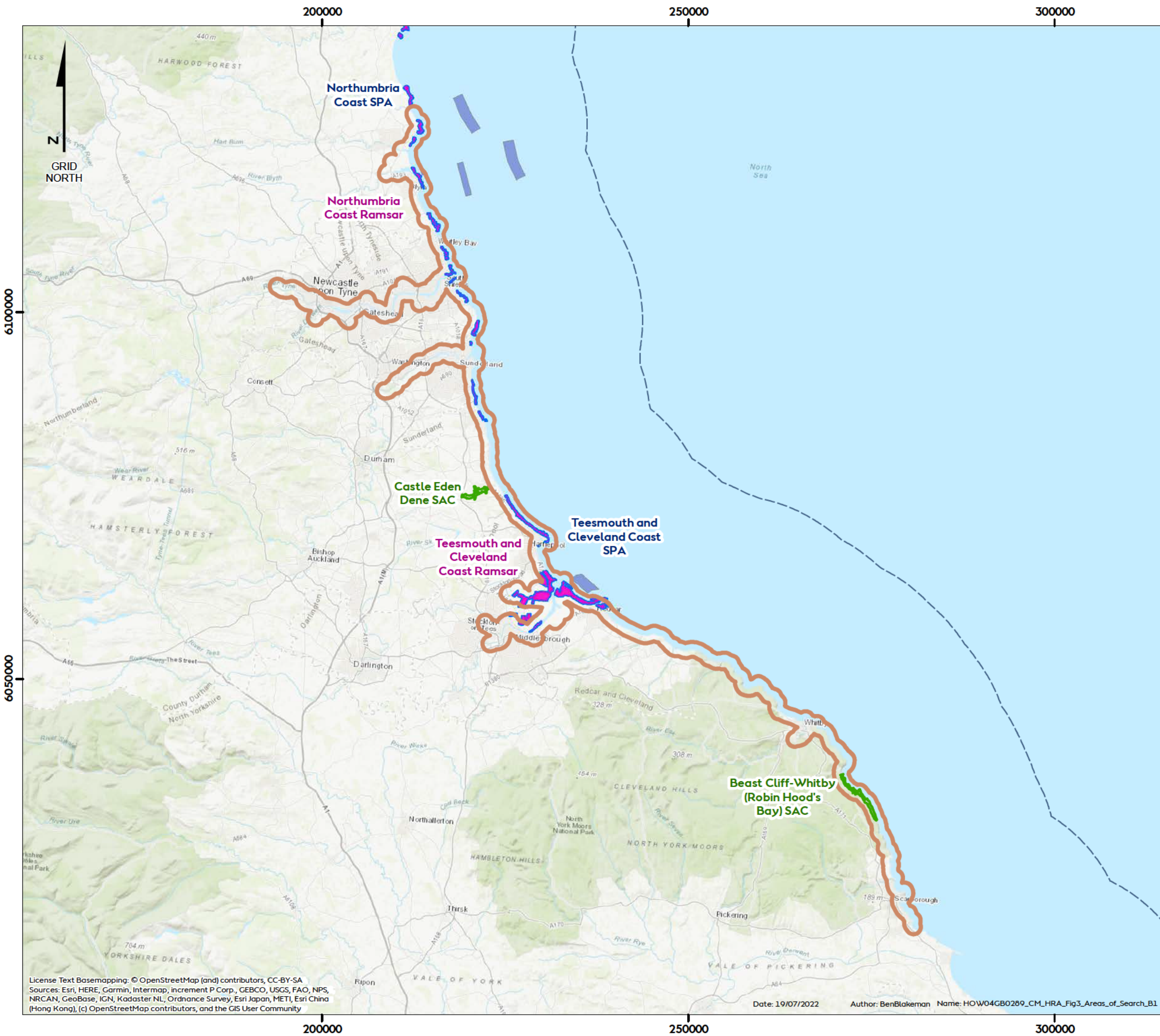
1.5.6.9 The number of monitoring visits is anticipated to be low, accessing the site on foot where possible. It is acknowledged that the location of the nesting structure is to be determined. Therefore, impacts from noise and odour are to be determined during detailed design phase once the proximity to local communities has been calculated. This is anticipated to be post-consent of Hornsea Four.

1.5.6.10 Monitoring and maintenance activities could theoretically comprise the following:

- Removal of kittiwake guano from structure and appropriate disposal;
- Remedial works to structure (i.e. storm damage to nesting ledges);
- Ensuring structure is structurally sound;
- Changing batteries used for speakers playing kittiwake calls; and
- Removal of litter, graffiti or any objects deemed hazardous to kittiwakes.

1.5.6.11 Further project description details in relation to the new onshore artificial nesting structure can be found in Revision 2 of [A4.6.1: Compensation Project Description](#) (Deadline 7 submission).



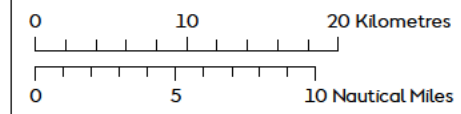


**Hornsea Four**  
 Figure 3  
 Compensation Measures  
 Areas of Search  
 Onshore Nesting  
 Cayton Bay to Blyth

- Onshore Nesting Area of Search
- UK 12M Limit
- Offshore Wind Farm
- Special Area of Conservation
- Special Protection Area
- Ramsar Site



Coordinate system: ETRS 1989 UTM Zone 31N  
 Scale@A3: 1:500,000



REV	REMARK	DATE
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A	Second Issue - Refined Search Areas	14/07/2022

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### 1.5.7 Bycatch Reduction Technology

- 1.5.7.1 The implementation of Bycatch Reduction technology is presented as a potential Compensation Measure for guillemot (*Uria aalge*), and razorbill (*Alca torda*) (Table 1).
- 1.5.7.2 Bycatch, which is the incidental capture of non-target species in fisheries, can present a significant pressure on seabird populations (Miles et al. 2020). Within recent decades, seabird populations have plummeted, largely due to commercial fisheries (direct competition and bycatch) (Croxall et al. 2012). Monitoring of the issue is extremely low with onboard observer monitoring coverage relatively low compared to the number of fishing vessels (Pott and Wiedenfeld 2017). To mitigate against the number of seabirds, specifically razorbills and guillemots that may be at risk of displacement, the Applicant proposes to support the overall numbers of these birds through the reduction of bird bycatch in selected UK fisheries with connectivity to the populations from FFC SPA.
- 1.5.7.3 The reduction of bird bycatch will be achieved through the use of additional deterrent equipment attached onto fishing gear. Different techniques are more suited to specific fishing gear types and specific target bycatch species of birds. The proposed bycatch reduction methods being considered as a package of compensation measures are above water deterrents (AWDs), net lights, and net panels.
- 1.5.7.4 Potential fisheries with reported bird bycatch hotspots and population connectivity with the FFC SPA includes the UK South coast. This location is being considered for potential bycatch reduction technology selection phase and future implementation. The AoS for Bycatch Reduction technology is shown in Figure 6; these depict areas where fishing takes place and where bycatch reduction technology selection phase will be targeted.

#### **Fishery selection**

- 1.5.7.5 Current research suggests that gillnetting, depending on location and seasonality, suffers high levels of bird bycatch (Northridge et al. 2020). As such, many of the bycatch reduction methods currently available are focussed on bycatch from gillnets. This Compensation Measure will therefore include reduction of bird bycatch from gillnet fisheries. There is less evidence to support the contribution of other fishing methods on bycatch, including mid-water trawl bycatch. Evidence gathering by the Applicant is ongoing for mid-water trawl bycatch, however, there is not currently enough evidence to demonstrate the efficacy of above water deterrents for bycatch reduction from mid-water trawls at the moment. However, currently all above bycatch reduction methods are being considered for mid-water trawling.
- 1.5.7.6 From April to July (breeding season), both guillemot and razorbill are located tightly around their colonies (around the coasts of the UK except for the Humber to the Isle of Wight). Outside of the breeding season, both species move further offshore, then start moving south. By December both species are located offshore around all UK coasts. As seabird distributions change throughout the year, it is likely that bycatch rates will also vary as higher seabird densities increase the bycatch risk (Bradbury et al., 2017). It is therefore important to evaluate temporal variations when identifying areas of high bycatch vulnerability for the purpose of planning bycatch reduction locations.
- 1.5.7.7 Potential fisheries with reported bird bycatch hotspots and population connectivity with the



wider site network and include the UK South coast. This location is being considered for potential bycatch reduction trials and future implementation.).

## **AWDs**

- 1.5.7.8 AWDs are typically structures fixed to buoys or markers attached to set fishing gear, which work to scare birds away from fishing nets. Current nets are often made from monofilament nylon, which is nearly invisible to seabirds underwater and so the aim of deterrents is to deter birds from approaching the nets and becoming entangled. Specifically, the proposed AWD is a Looming Eyes Buoy (LEB), which is comprised of a floating buoy, topped by a long stick and a marker on the top that includes an eye-like pattern (Figure 4). The aim of the buoy is to work like a scarecrow in scaring birds away from nets. The eye design on the top panel may mimic deterrent eye patterns found in nature, whilst the bobbing and spinning of the buoy will result in a “looming” effect over the birds, thus deterring them from approaching the buoys. They are not designed to make any noise or light and are attached to the fishing equipment already in place. No additional vessel presence and/or movement or equipment is required.

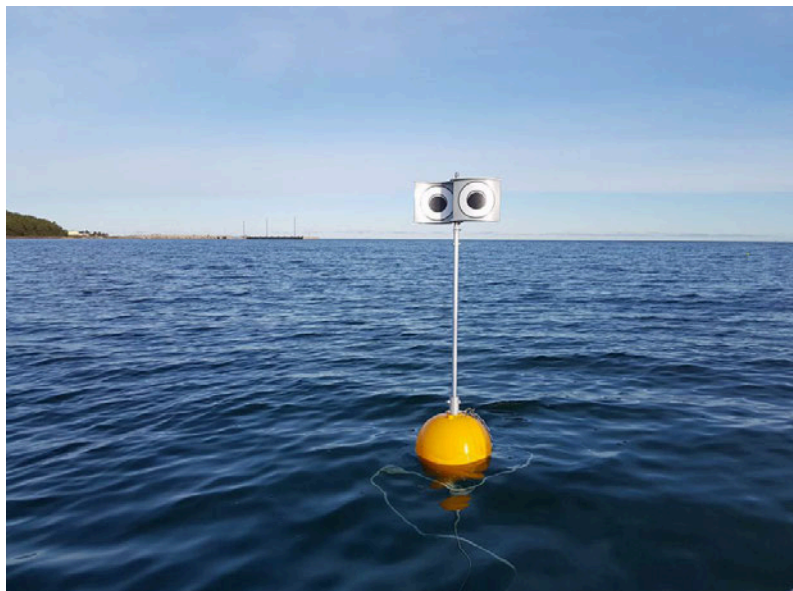


Figure 4: Looming Eyes Buoy (Source: The Independent <sup>2</sup>).

## **Net lighting (Light Emitting Diodes [LEDs])**

- 1.5.7.9 LED net lights are small simple lights which can be attached to existing fishing gear to act as a deterrent to non-target species (Figure 5). The aim of the lights is to increase the visibility of the nets in the water to birds and marine mammals so that they do not become entangled with the nets. There are multiple designs available of these lights, with the majority being pre-attached to the nets ahead of deployment and remaining in place until the nets are hauled in. No additional vessel presence and/or movement or equipment is required.

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<sup>2</sup> [REDACTED]



Figure 5: A commercially available net light (Source: Fishtek<sup>3</sup>)

### Net panels

- 1.5.7.10 Attaching highly visible panels to nets may increase the visibility of the nets to diving birds and therefore reduce bycatch. Panels may comprise equally spaced black and white squares, attached to the surface of nets, to ensure they are highly visible to diving birds. The panels often require holes in them to reduce the effect of currents on the set gear. The panels are pre-attached to nets and are deployed as the nets are set. No additional vessel presence and/or movement or equipment is required.

### Implementation, operation and monitoring

- 1.5.7.11 The bycatch reduction technology selection and implementation study phases for Looming Eye Buoys commenced in October 2021. In order to determine the most effective bycatch reduction method, the Applicant commenced a bycatch reduction technology selection phase in 2021, focusing on the use of Looming Eyes Buoys (LEB) within an active gillnet fishery within the biogeographic range of guillemot and razorbill. LEB were selected as they are one of the most developed forms of above water deterrent, which have been developed and trialled by BirdLife International/ RSPB in conjunction with Fishtek Marine (i.e. Rouxel et al., 2021). The preliminary findings from the bycatch reduction technology selection phase using the LEB are promising, with an initial 25% reduction in bycatch of auks identified. ([G5.13 Bycatch Reduction Technology Selection Phase Summary](#) submitted at Deadline 5, [REP5-068](#)). The results of the bycatch reduction technology selection phase are similar to the results from Rouxel et al., 2021 who provided the first experimental test of the LEB (noting the differences in study species). The Applicant has committed to use the LEB on vessels during the non-breeding season 2022/2023 and collect further data from September 2022 to March 2023.
- 1.5.7.12 Implementation of the planned compensation will begin following determination of the DCO application by the Secretary of State. To ensure that the equipment continues to be used and that further evidence can be gathered to confirm the success of the measures, a monitoring programme may be required during the operational use of the measures. There are many examples of fishing gear monitoring around the world, which include but are not limited to gear cameras, self-reporting, blue-tooth tags, and equipment trackers. The exact method of monitoring to be used will be decided based upon further evidence gathering and discussion with industry experts. The Wind Farm is expected to operate for 35 years following construction. If

<sup>3</sup> [REDACTED]



required, the accepted bycatch reduction measure(s) would be used and monitored throughout the operational lifespan of the wind farm. Following the monitoring programme, overall measure uptake and success of the bycatch reduction measure, the equipment may continue to be used as a deterrent.

# Hornsea Four

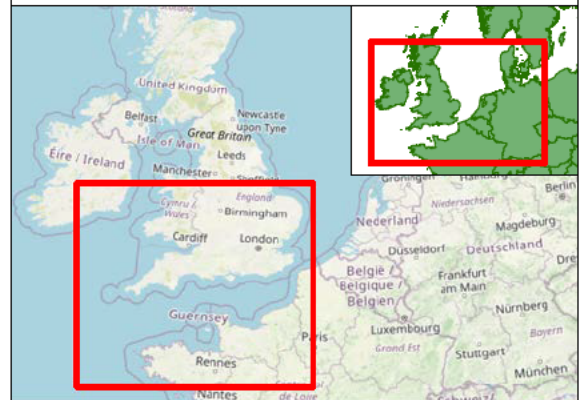
## Figure 6

### Compensation Measures Areas of Search

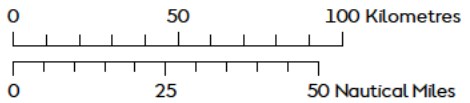
#### Bycatch

#### South Coast of England

-  Bycatch Area of Search
-  UK 12M Limit
-  Economic Exclusion Zone Boundary
-  Offshore Wind Farm
-  Special Area of Conservation
- Southern North Sea SAC**
-  Summer Area
-  Summer and Winter Area
-  Winter Area

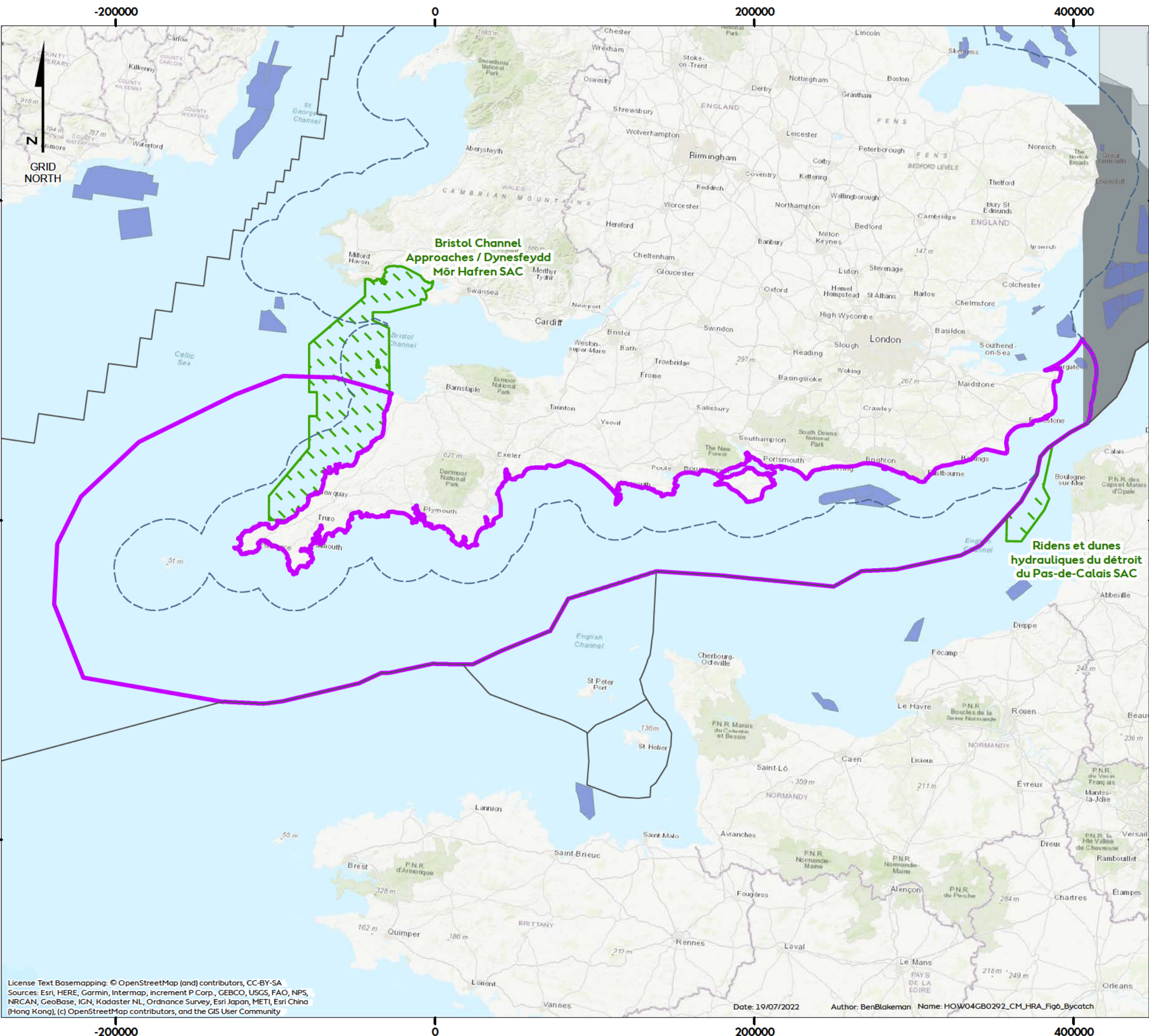


Coordinate system: ETRS 1989 UTM Zone 31N  
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## 1.5.8 Predator Eradication

- 1.5.8.1 To compensate the potential displacement impact on guillemot and razorbill from the operation of the Hornsea Four offshore wind farm, the Applicant proposes to implement a predator eradication programme at selected guillemot and / or razorbill breeding colonies. The selected colony will be chosen based on delivery and connectivity to the populations from FFC SPA. This would be part of a package of compensation measures for these species.
- 1.5.8.2 Predator eradication will be undertaken using well established methods evidenced throughout the wealth of previous predator eradication examples from the UK and further afield. For ground predators, such as rats, this usually involves poison bait stations. The primary species the measures of predator eradication would be focussed upon are rat and house mouse but could extend to include mink or crow as a supportive measure pending ecological advice and stakeholder discussions, whilst ensuring non-targeted species are accidentally eradicated.
- 1.5.8.3 Following the removal of the invasive species, biosecurity measures will subsequently be installed to prevent re-invasion. Biosecurity measures form a vital consideration in ensuring that efforts to remove invasive species have not been undertaken in vain. There are a significant number of biosecurity measures available depending on the location and species being considered, all of which have been tried and tested at previous predator eradication schemes (e.g., Biosecurity for LIFE projects).

### Location

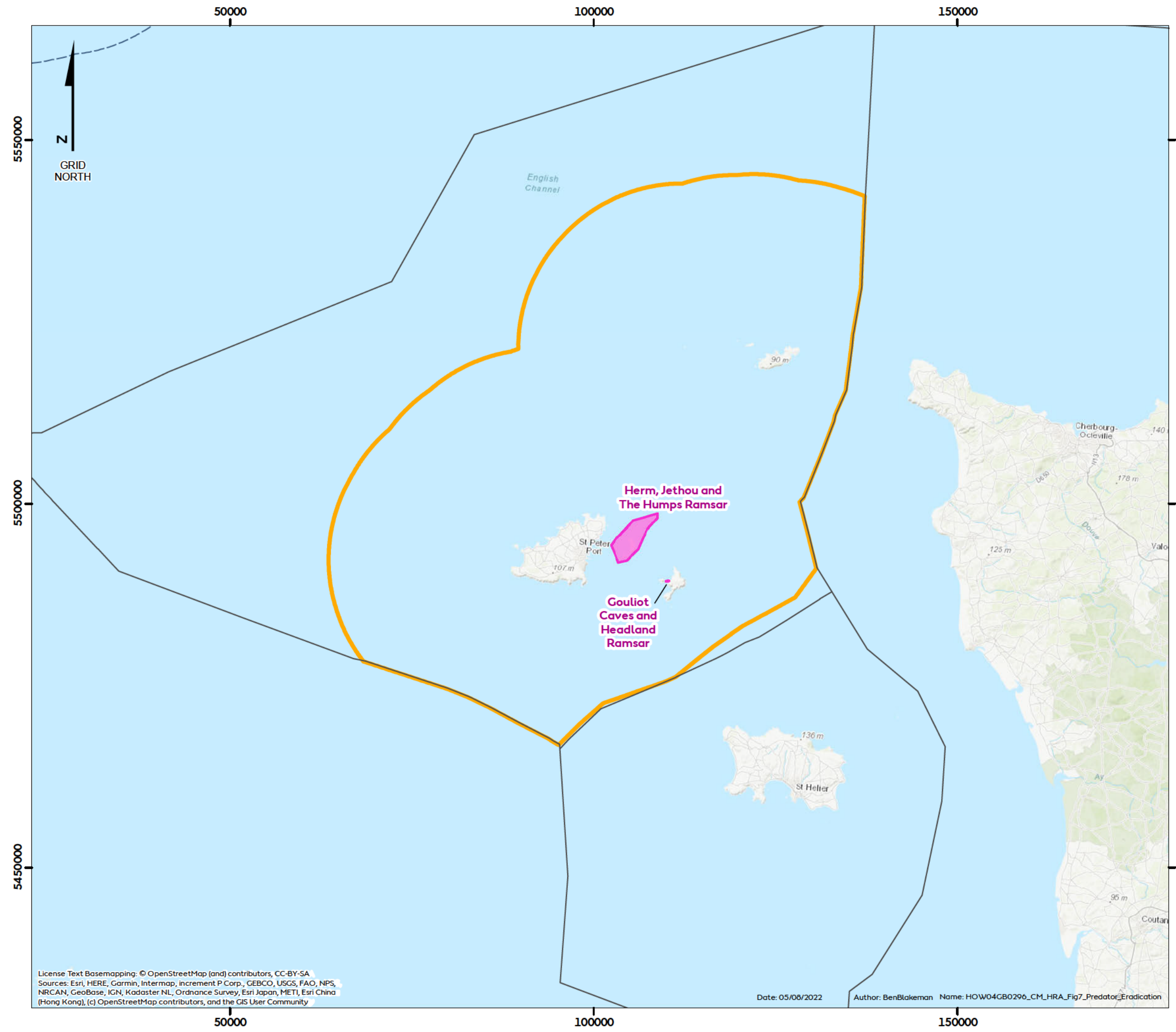
- 1.5.8.4 It is proposed that predator eradication will be undertaken on an island or islands where both invasive mammalian predators and guillemot and/ or razorbill are present. The Applicant has been liaising with site managers at multiple islands to understand the prevalence of invasive mammalian species and ascertain the level of pressure posed to breeding guillemot and razorbill. The area currently being considered for predator eradication is the Bailiwick of Guernsey, within the Channel Islands.
- 1.5.8.5 Before any predator eradication schemes are implemented at a specific location, an eradication implementation study will be undertaken to ensure measures can be employed to remove the invasive species and that biosecurity measures can be subsequently installed to prevent reinvasion, whilst not affecting the native species and/or species that may not affect guillemot and/or razorbills. The island implementation studies were initiated in 2021 by the Applicant in the Bailiwick of Guernsey to gather further evidence to maximise the chances of success of the eradication programme and feed into the decision-making process of which island(s)/islet(s) to take forward. It is planned that the implementation studies will be completed in 2022 before the DCO is granted. An update of the progress up to June 2022 is presented within [G5.4: Predator Eradication Implementation Study Update](#) (submitted at Deadline 5, [REP5-082](#)). An MoU has been agreed by the States of Guernsey (dated 10th June 2022) providing a framework to ensure support and long term security of the compensation measure. Based on the evidence collected during the eradication implementation studies and presented within [G5.4: Predator Eradication Implementation Study Update \(REP5-082\)](#), the Applicant is highly confident it has determined locations where an eradication is highly feasible, deliverable and will result in benefits to guillemot and razorbill.

## Operation, implementation, and monitoring

- 1.5.8.6 The objective of the eradication programme will be to remove mammalian predators from the island(s) that are currently suppressing the breeding success (and therefore, population size) of guillemot and razorbill (amongst other species) at these locations. The removal of this pressure will therefore lead to an increase in productivity and ultimately an increase in the population size of these species, whilst not affecting any other species that are not known to be detrimental to guillemot and/or razorbills.
- 1.5.8.7 Following the implementation study and in partnership with site managers, invasive species eradication specialists will be contracted to undertake the island(s) eradication. Consideration of the timing of a predator eradication programme will be made to ensure that they are undertaken at the optimal time and that will not for example affect a species/habitat that are not known to be detrimental to guillemot and/or razorbills.
- 1.5.8.8 The primary aim of an eradication scheme is always to completely remove the introduced animal from the chosen area. In theory, just a single pregnant female of the invasive animal could repopulate the area. Two years intensive monitoring for the presence of the eradicated animal is required to receive the invasive-free status (Nathan et al., 2015; Russell et al., 2017). For example, this was the process taken for the eradication of rats on Canna and Sanday under contract by Wildlife Management International, starting in late 2005. By February 2006 the last rat sign was detected, and after a two-year period of intensive monitoring, the island was declared rat-free in 2008 (see Bell, et al., 2011). The predator eradication programme would only be undertaken by appropriate qualified people and all methods will be agreed with the appropriate stakeholders.
- 1.5.8.9 Following the invasive species free status, seabird recovery monitoring will continue for the lifetime of Hornsea Four. Monitoring will include population census and productivity monitoring. This will be compared to pre-eradication data (which will be collected to characterise the baseline and supplement historic seabird data for the location where available). The presence of invasive species will also be monitored to detect signs of repopulation.





## Summary of Predator Eradication Compensation Measure

- 1.5.8.10 Predator eradication is a primary Compensation Measure. In-combination with other primary razorbill and guillemot measures, predator eradication will be able to deliver the required level of compensation for Hornsea Four. A detailed evidence report, and roadmap has been submitted with the DCO application to demonstrate the potential compensation deliverable by the predator eradication programme both alone and combined with the other primary compensation measures. The evidence report includes a summary of the supporting evidence for predator eradication compensation and the roadmap outlines the further steps that will be undertaken from submission to demonstrate that the Compensation Measure can be secured. These Compensation Measures are effective, feasible and securable measures that can be implemented prior to the impact occurring and sustainable for the lifetime of the project. In designing this compensation measure the Applicant has consulted and worked with Natural England, JNCC, the RSPB, The Wildlife Trust, other statutory bodies and other relevant stakeholders to seek to ensure this compensation measure is both robust, deliverable and effective.



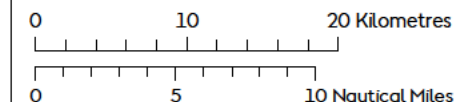
# Hornsea Four

Figure 7  
 Compensation Measures  
 Areas of Search  
 Predator Eradication  
 Bailiwick of Guernsey

-  Predator Eradication Area of Search
-  UK 12M Limit
-  Economic Exclusion Zone Boundary
-  Ramsar Site



Coordinate system: ETRS 1989 UTM Zone 31N  
 Scale@A3: 1:500,000



REV	REMARK	DATE
—	First Issue	25/08/2021
A	Second Issue - Refined Search Areas	05/08/2022

Compensation Measures  
 Areas of Search  
 Document no: HOW04GB0296  
 Created by: BPHB  
 Checked by: CG  
 Approved by: LK



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 Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community



### 1.5.9 Resilience Measure – Fish Habitat Enhancement (Seagrass)

- 1.5.9.1 Fish habitat enhancement (as a concept) seeks to improve vital habitats for fish species such as those that provide spawning or nursery grounds, with an aim of increasing the productivity of fish populations. This in turn will increase prey abundance for many seabird species (e.g. kittiwakes, guillemots) who are known to forage in coastal shallow water areas when nesting (Bugge et al. 2011; Redfern and Bevan 2014) and consume young fish known to be abundant in seagrass (Bugge et al. 2011; Lilley and Unsworth 2014). Therefore, the restoration of seagrass habitats is being considered as a potential Resilience Measure to boost key forage fish densities for kittiwake, guillemot and razorbill breeding adults to compensate for the estimated impact of Hornsea Four.
- 1.5.9.2 The Applicant recognises the importance of seagrass as a measure that can provide resilience to other compensation measures such as predator eradication, habitat management, Bycatch Reduction and provision of artificial nesting. The Applicant proposes to provide a package of measures that will support the seabird populations such as kittiwake, guillemot and razorbill locally and in the North Sea. The measures will be designed to seek opportunities to be spatially co-located to maximise the benefits of the measures and located to ensure the overall coherence of the network is maintained. The Applicant is exploring opportunities to expand existing seagrass restoration projects that are already underway and opportunities to create new projects with the academic community that could potentially improve the resilience of the compensation measure.
- 1.5.9.3 The site selection process for these seagrass locations is outlined in the ‘without prejudice’ Derogation Case (specifically [B2.8.5 Compensation measures for FFC SPA: Fish Habitat Enhancement: Ecological Evidence, APP-198](#)). The purpose of the site selection process has been to identify an area that supports all the target seabird species and is suitable for seagrass restoration projects. The resulting AoS for seed collection and/or seagrass restoration is shown in [Figure 8](#), with this area consistently supporting all of the target seabird species, providing options for seagrass restoration as well as supporting other compensation measures. This location (Humber Estuary) has been taken forward for trials and has been determined through the implementation study as the highest scoring future implementation. [G6.6 Fish Enhancement Seagrass Restoration Implementation Study and Fish Monitoring Summary \(REP6-033\)](#) presents an update on the ongoing monitoring work and research studies in relation to this measure and an overview of the anticipated next steps.
- 1.5.9.4 Consultation will commence with conservation and ornithological groups with local knowledge and expertise. The detail of the continued site selection process and consultation is presented within [B2.9: Record of Consultation \(APP-201\)](#).

#### **Seagrass restoration trials**

- 1.5.9.5 Prior to obtaining consent of Hornsea Four, the Applicant has explored suitable locations and selected the area deemed most suitable for seagrass restoration to provide resilience for the Hornsea Four compensation measures. The refined area for seagrass restoration is Spurn Point in the Humber Estuary and the Applicant has commenced seagrass restoration efforts with a trial scheme. In total the Applicant has contracted the Yorkshire Wildlife Trust (YWT) to restore 4 ha of seagrass beds and has an agreement in place to deliver the full

large-scale restoration of a further 30 ha following SoS decision. The Applicant is also undertaking a UK site implementation study for proposed adaptive management measures.

- 1.5.9.6 The area within which the trial planting is taking place is Spurn Point, this location was selected by the YWT and the Applicant being adjacent to remnant seagrass beds and as YWT own the foreshore and have a byelaw in place to protect the area. Further studies of the seagrass restoration scheme are being conducted by the YWT and the University of Hull, these aim to monitor the success of the restoration effort, effects on fish assemblages and abundance and demonstrate fish connectivity to wider North Sea.

### **Restoration techniques**

- 1.5.9.7 The Applicant is considering two techniques by which to restore seagrass habitats: replanting and reseeded.
- 1.5.9.8 Seagrass restoration has been formally conducted for over 50 years and the means of doing this can principally be split into two major techniques: reseeded and replanting. Both techniques have their relative merits and have exhibited varying levels of success. Reseeded generally relates to the collection and targeted redistribution (and sometimes processing) of wild seed. Seeds can be directly deployed either from the boat or for intertidal areas deposited using a tree planting tool (pottiputki), and often hessian bags are used to help anchor the seeds in place during germination. It is expected that if vessels are required, then up to two vessels would be required for the seagrass restoration.
- 1.5.9.9 Adult shoot replanting normally involves harvesting plants from an existing meadow and transplanting them to the restoration site. For the replanting process, the reproductive fronds of wild seed is often collected by hand by SCUBA divers or by collection on foot from the foreshore. In most cases, shoot planting involves some means of anchoring the shoots to the bottom until the roots can take hold (root into the bottom). Replanting uses either labour intensive diving techniques or various mechanistic approaches to planting various sizes and ages of seagrass plants into new localities. Planting of seedlings in the UK is typically undertaken by a team of divers who are transported to the site by boat for subtidal areas or by personnel using a manual hand tool (dibber and seed press) on foot for intertidal areas.

### **Monitoring and Adaptive Management**

- 1.5.9.10 Hornsea Four is expected to operate for 35 years following construction. Monitoring of restoration will be essential to demonstrate the efficacy of the compensation measure and if required, the seagrass meadow would be monitored throughout the operational lifespan of the Hornsea Four. The exact method of monitoring will be decided based upon further evidence gathering and discussion with restoration experts and stakeholders. A monitoring programme will be developed and at key stages the results of the restoration will be shared to improve the knowledge and evidence for seagrass restoration.
- 1.5.9.11 Adaptive management is an iterative process which combines management measures and subsequent monitoring with the aim of improving effectiveness whilst also updating knowledge and improving decision making over time. Adaptive management will be an important component of the compensation measure and will be used as a method to

address unforeseen issues or deviations from expected time scales (i.e. additional infill planting required).

- 1.5.9.12 It is assumed that any onshore access to the area chosen for seagrass restoration will be through existing highways and/or footpaths. It is considered that no new access roads will be required and that no construction is required as part of the measure. Any requirement for vehicle movements during site suitability surveys, the restoration process or subsequent monitoring are considered to be negligible. Therefore, onshore impacts have been scoped out of the assessment.








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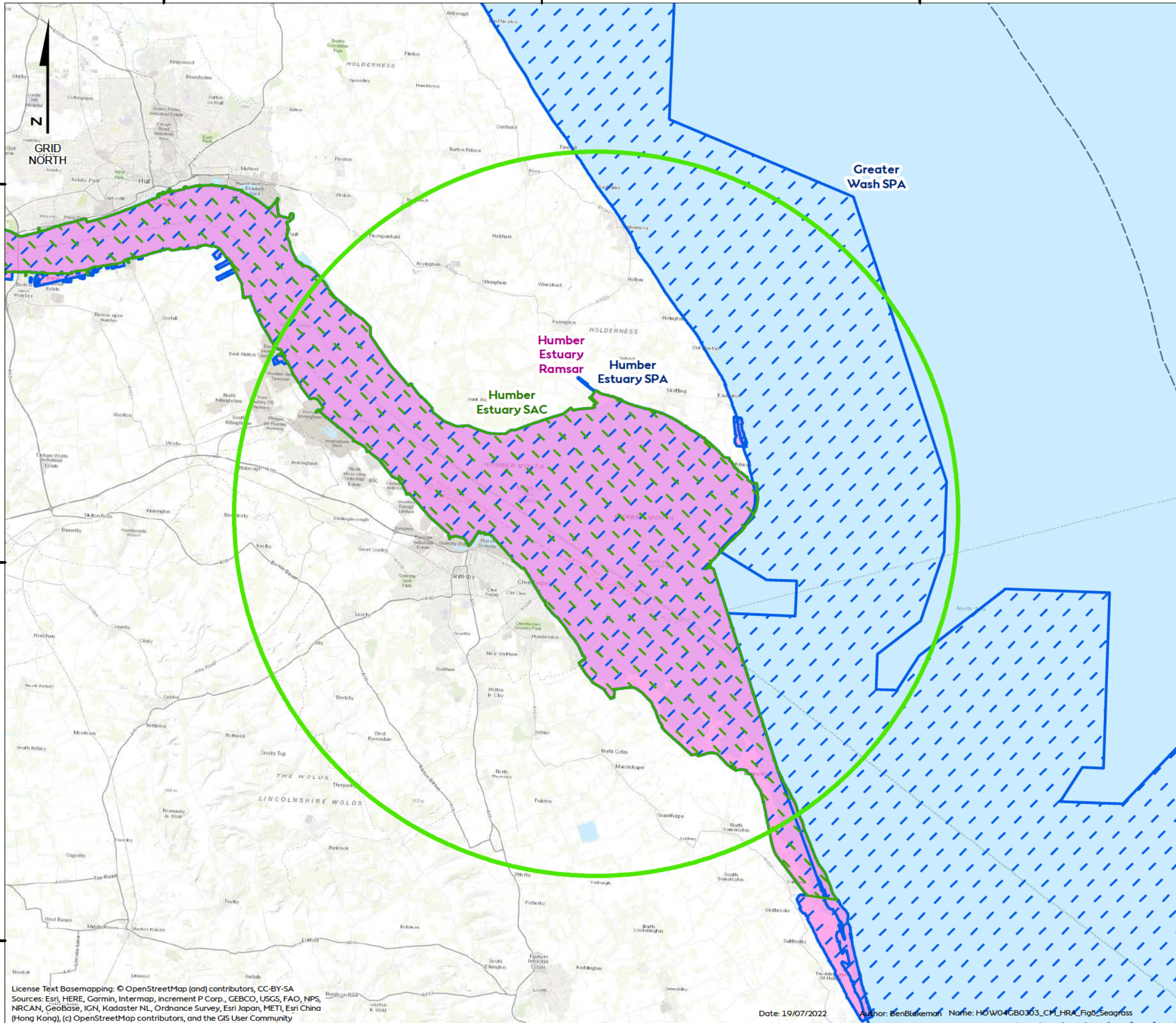
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# Hornsea Four

## Figure 8 Compensation Measures Areas of Search Seagrass Humber Estuary

-  Seagrass Area of Search
-  UK 12M Limit
-  Special Area of Conservation
-  Special Protection Area
-  Ramsar Site



Coordinate system: ETRS 1989 UTM Zone 31N  
 Scale@A3: 1:200,000

0 5 10 Kilometres

0 2.5 5 Nautical Miles

REV	REMARK	DATE
—	First Issue	25/08/2021
A	Second Issue - Refined Search Areas	14/07/2022

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 Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Date: 19/07/2022 Author: Ben Blakeman Name: HOW04GB0303\_CM\_LHRA\_Fig8\_Seagrass

Compensation Measures  
 Areas of Search  
 Document no: HOW04GB0303  
 Created by: BPHB  
 Checked by: GG  
 Approved by: LK





## 2 Habitats Regulations Assessment Process

### 2.1 Legislative Context

2.1.1.1 The legislative context for HRA, including the relevant articles of legislation, is detailed within the RIAA (B2.2: Report to Inform Appropriate Assessment, REP5-012) with that information not repeated here.

### 2.2 The Habitats Regulations Process

2.2.1.1 The HRA process is detailed within the RIAA (B2.2: Report to Inform Appropriate Assessment, REP5-012), with that information not repeated here beyond inclusion of Figure 9, reproduced from PINS Advice Note Ten 'Habitats Regulations Assessment relevant to nationally significant infrastructure projects' (Version 8, November 2017). This clearly defines HRA as a step by step process; the current report is concerned with Stage 1 (screening) and Stage 2 (Appropriate Assessment) only with no requirement to progress to subsequent stages identified.

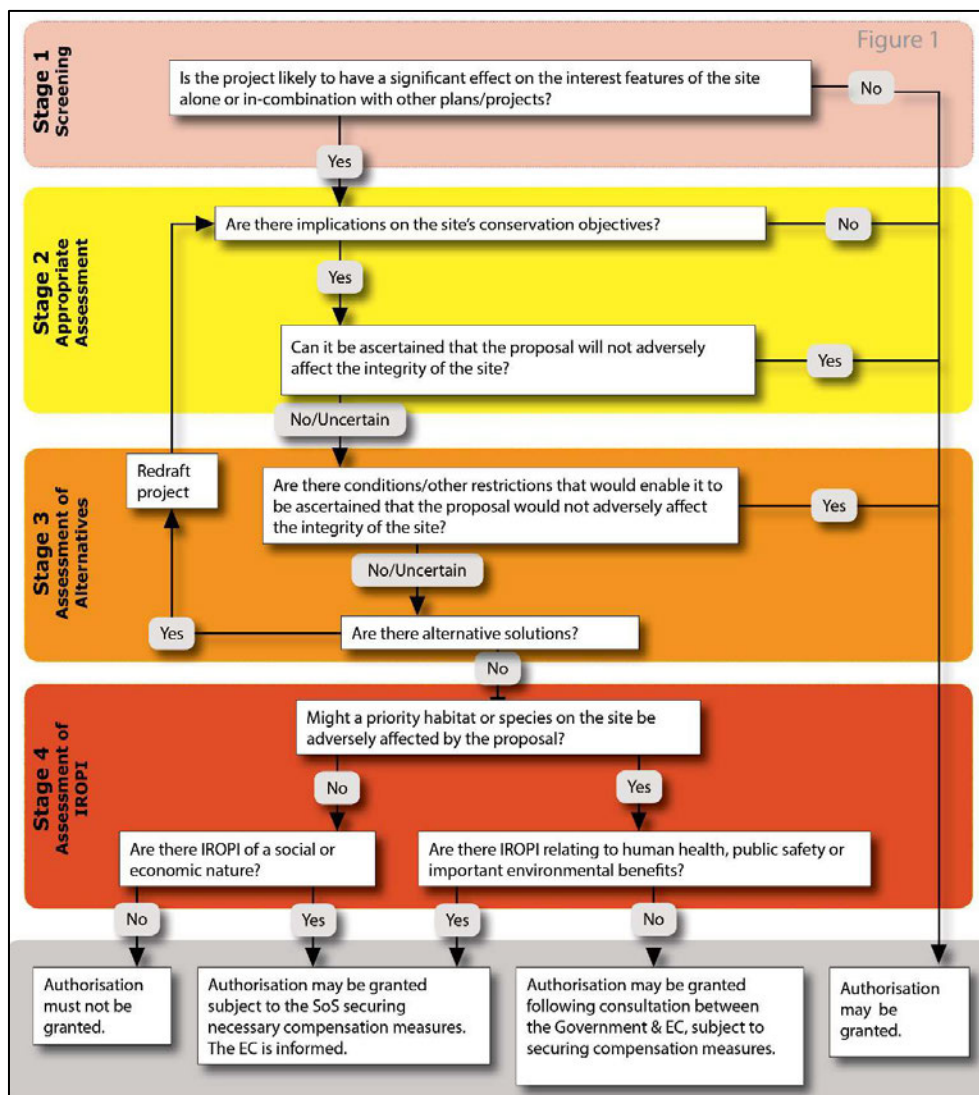


Figure 9: Four stage HRA process (The Planning Inspectorate 2016).



## 2.3 Approach to Screening (HRA Stage 1)

### 2.3.1 Introduction

2.3.1.1 The requirements for Stage 1 screening are detailed within the RIAA ([B2.2: Report to Inform Appropriate Assessment, REP5-012](#)). That information is not repeated here in full, with the exception of a few key points below.

2.3.1.2 For consideration of in-combination aspects, it is assumed for screening purposes that where potential for LSE applies alone, that potential for LSE applies in-combination. It is recognised that there remains the potential for an effect which does not result in potential LSE alone to contribute to a potential LSE in-combination; however no such effects have been identified for the compensation measures.

2.3.1.3 Due to the scale of the various AoS, the number of sites included and uncertainty on location(s) for the potential Compensation Measures, the approach to this document follows a similar approach to that applied for plan-level HRA screening, as developed by The Crown Estate for offshore wind leasing rounds. This plan-level approach using regions for screening is useful as these large areas are likely to be similar in their biogeographic characteristics and Compensation Measures proposed within them are likely to have a similar screening profile, that is the list of European sites and their features screened in for each of those Compensation Measures is expected to be similar (although not identical). Whilst the likely magnitude of any impact on those European sites and their features might vary between Compensation Measures, this is not relevant to the identification of LSE using a simple, precautionary criterion of connectivity.

2.3.1.4 An overview of the approach to this Compensation Measures HRA process is provided in [Figure 10](#).

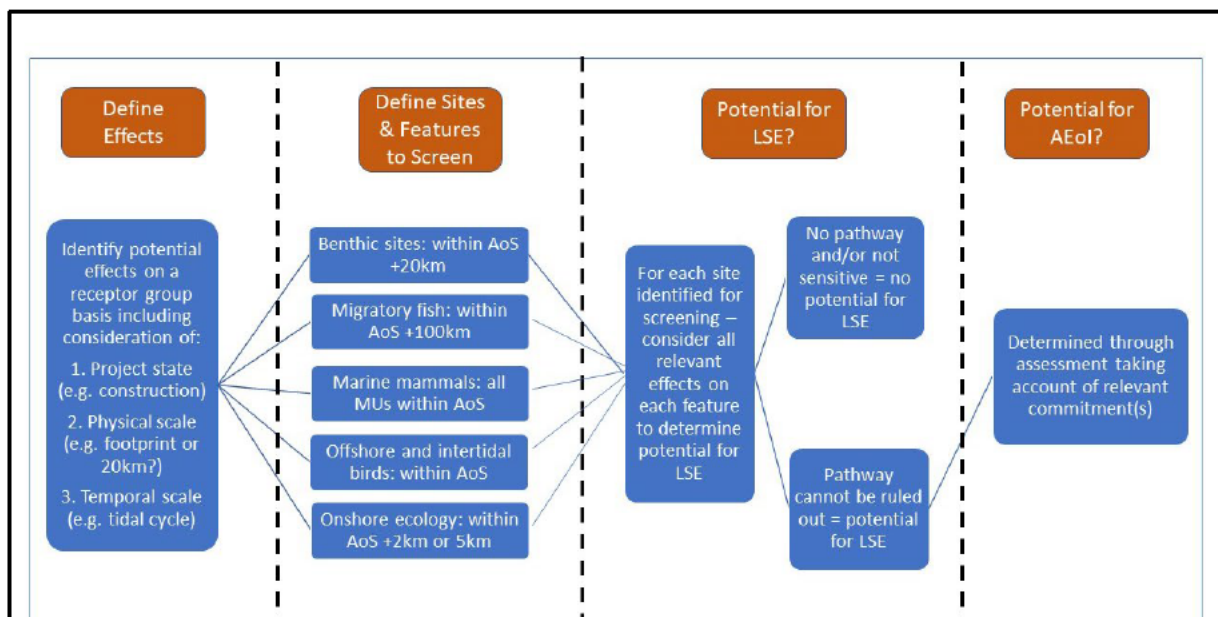


Figure 10: Compensation Measures HRA Process

## 2.3.2 Identification of Potential Effects

2.3.2.1 Considerable experience and knowledge exists from previous offshore wind farm projects, as well as other onshore and offshore developments, with regard to the potential effects that may result from the installation/ construction, implementation/ operation/ maintenance, and decommissioning (where required) of these Compensation Measures. This therefore provides a wealth of knowledge which can be drawn upon by the Applicant when identifying the potential effects that need to be considered through the screening process. In addition, for a number of the designated sites identified, Natural England has prepared site advice packages and supporting documents, which are intended to help with site assessments and the impact of marine activity in sensitive areas. Specifically, the 'advice on operations' documents are relevant here, as these identify the type of effect that specific features are sensitive to. All these sources of information have been drawn together to produce a list of effects that may result from each Compensation Measure and that need to be taken into account when determining the potential for LSE for designated sites and features. The potential effects identified for each Compensation Measure are detailed in [Table 4](#).

Table 4: Potential effects from the Compensation Measures on relevant receptor types.

Receptor Type	Potential Effect	Installation/ Construction	Implementation/ Operation/ Maintenance	Decommissioning
<b>New offshore artificial nesting structure</b>				
Annex I habitats (designated benthic habitats)	Temporary habitat loss/disturbance and direct damage e.g. by jack-up vessels and seabed preparation.	✓	✗	✗
	Increases in suspended sediment concentrations and deposition of disturbed sediments to the seabed e.g. due to seabed preparation and drilling for foundation installation.	✓	✗	✗
	Accidental pollution.	✓	✓	✓
	Long term loss of seabed habitat through presence of foundations and scour protection, resulting in potential effects on benthic receptors.	✗	✓	✗
	Maintenance operations may result in temporary seabed disturbances and potential effects on benthic ecology.	✗	✓	✗
	Colonisation of foundations and scour protection may affect benthic ecology and biodiversity.	✗	✓	✗
	Increased risk of introduction or spread of invasive and non-native species due to presence of subsea infrastructure, scour protection and vessel movements (e.g. ballast water).	✗	✓	✗
	Temporary disturbance or loss of habitat due to operations to remove structure, and associated jack-up operations.	✗	✗	✓
	Temporary increases in suspended sediment concentrations and deposition from removal of structure.	✗	✗	✓
Removal of foundation leading to loss of species/habitats colonising the structure.	✗	✗	✓	
Annex II species (migratory fish and freshwater pearl mussel)	Temporary habitat loss/disturbance and direct damage e.g. by jack-up vessels and seabed preparation.	✓	✗	✗
	Increases in suspended sediment concentrations and deposition of disturbed sediments to the seabed e.g. due to seabed preparation and drilling for foundation installation.	✓	✗	✗
	Underwater noise as a result of foundation installation (i.e. piling) and Unexploded Ordnance clearance resulting in potential effects on fish and shellfish receptors.	✓	✗	✗
	Accidental pollution.	✓	✓	✓
	Long term loss of seabed habitat through presence of foundations and scour protection, resulting in potential effects on fish and shellfish ecology.	✗	✓	✗
	Colonisation of foundations and scour protection may affect fish and shellfish ecology.	✗	✓	✗
	Maintenance operations may result in temporary seabed disturbances and potential effects on fish and shellfish ecology.	✗	✓	✗
Temporary loss of habitat due to operations to remove structure, and associated jack-up operations.	✗	✗	✓	

Receptor Type	Potential Effect	Installation/ Construction	Implementation/ Operation/ Maintenance	Decommissioning
	Temporary increases in suspended sediment concentrations and deposition from removal of structure resulting in potential effects on fish and shellfish ecology.	*	*	✓
	Effects on fish and shellfish receptors due to removal of structure leading to loss of hard substrates and structural complexity.	*	*	✓
	Decommissioning activities producing subsea noise resulting in potential effect on fish and shellfish receptors.	*	*	✓
Annex II species (marine mammals)	Increased vessel traffic during construction may result in an increase in disturbance to or collision risk with marine mammals.	✓	*	*
	Increased suspended sediments arising from construction activities, such as seabed clearance or drilling, may reduce water clarity and impair the foraging ability of marine mammals.	✓	*	*
	Underwater noise from foundation piling and Unexploded Ordnance clearance has the potential to cause injury or disturbance to marine mammals.	✓	*	*
	Accidental pollution.	✓	✓	✓
	Increased vessel traffic during operation and maintenance may result in an increase in disturbance to, or collision with marine mammals.	*	✓	*
	Underwater noise arising from decommissioning activities and associated vessels may cause disturbance to marine mammals.	*	*	✓
	Increased vessel traffic during decommissioning activities may result in an increase in disturbance to, or collision risk with marine mammals.	*	*	✓
	Increased suspended sediments arising from decommissioning activities may impair the foraging ability of marine mammals.	*	*	✓
Offshore and Intertidal Ornithology	The impact of construction activities such as increased vessel activity and underwater noise may result in direct disturbance or displacement from important foraging and habitat areas of birds.	✓	*	*
	Accidental pollution.	✓	✓	✓
	The impact of physical displacement from an area around the structure may result in effective habitat loss and reduction in survival or fitness rates.	*	✓	*
	The impact of barrier effects caused by the physical presence of the structure may prevent clear transit of birds between foraging and breeding sites, or on migration.	*	✓	*
	The impact of attraction to a lit structure by migrating birds in particular may cause disorientation, reduction in fitness and possible mortality.	*	✓	*



Receptor Type	Potential Effect	Installation/ Construction	Implementation/ Operation/ Maintenance	Decommissioning
	The impact of maintenance activities such as increased vessel activity may result in disturbance or displacement from important foraging and habitat areas of birds.	✘	✔	✘
	The impact of direct disturbance and displacement due to underwater noise and vessel traffic may result in disturbance or displacement from important foraging and habitat areas of birds.	✘	✘	✔
<b>Repurposed offshore artificial nesting structure</b>				
Annex I habitats (designated benthic habitats)	Temporary habitat loss/disturbance and direct damage by e.g. by jack-up vessels.	✔	✘	✘
	Accidental pollution.	✔	✔	✔
	Maintenance operations may result in temporary seabed disturbances and potential effects on benthic ecology.	✘	✔	✘
	Temporary loss of habitat due to operations to remove structure and associated jack-up operations resulting in potential effects on benthic ecology.	✘	✘	✔
	Temporary increases in suspended sediment concentrations and deposition from removal of structure resulting in potential effects on benthic ecology.	✘	✘	✔
	Removal of foundation leading to loss of species/ habitats colonising the structure.	✘	✘	✔
Annex II species (migratory fish and freshwater pearl mussel)	Temporary habitat loss/disturbance and direct damage e.g. by jack-up vessels	✔	✘	✘
	Accidental pollution.	✔	✔	✔
	Maintenance operations may result in temporary seabed disturbances and potential effects on fish and shellfish ecology.	✘	✔	✘
	Temporary loss of habitat due to operations to remove structure, and associated jack-up operations resulting in potential effects on fish and shellfish ecology.	✘	✘	✔
	Temporary increases in SSCs and deposition from removal of structure resulting in potential effects on fish and shellfish ecology.	✘	✘	✔
	Effects on fish and shellfish receptors due to removal of structure leading to loss of hard substrates and structural complexity.	✘	✘	✔
	Decommissioning activities producing subsea noise resulting in potential effect on fish and shellfish receptors.	✘	✘	✔
Annex II species (marine mammals)	Increased vessel traffic during repurposing may result in an increase in disturbance to or collision risk with marine mammals.	✔	✘	✘
	Accidental pollution.	✔	✔	✔
	Increased vessel traffic during operation and maintenance may result in an increase in disturbance to, or collision with marine mammals.	✘	✔	✘

Receptor Type	Potential Effect	Installation/ Construction	Implementation/ Operation/ Maintenance	Decommissioning
	Increased vessel traffic during decommissioning activities may result in an increase in disturbance to, or collision risk with marine mammals.	*	*	✓
	Underwater noise arising from decommissioning activities and associated vessels may cause disturbance to marine mammals.	*	*	✓
	Increased suspended sediments arising from decommissioning activities may impair the foraging ability of marine mammals.	*	*	✓
Offshore and Intertidal Ornithology	The impact of construction activities such as increased vessel activity may result in direct disturbance or displacement from important foraging and habitat areas of birds.	✓	*	*
	The impact of pollution including accidental spills and contaminant releases which may affect species' survival rates or foraging activity.	✓	✓	✓
	The impact of direct disturbance and displacement due to underwater noise and vessel traffic may result in disturbance or displacement from important foraging and habitat areas of birds.	*	*	✓
<b>New onshore artificial nesting structure</b>				
Onshore Ecology	Temporary habitat loss and/or disturbance.	✓	✓	✓
	Permanent habitat loss and/ or disturbance.	*	✓	*
	Dust generation and nitrogen deposition at designated sites from HGVs and plant.	✓	*	✓
<b>Resilience measure – fish habitat enhancement (seagrass)</b>				
Annex I habitats (designated benthic habitats)	Temporary habitat disturbance from planting activities and seabed sampling.	✓	*	*
	Increases in suspended sediment concentrations and deposition of disturbed sediments to the seabed due to planting activities and seabed sampling.	✓	*	*
	Change of habitat type following introduction or reinstatement of seagrass.	*	✓	*
	Accidental pollution.	✓	✓	*
Annex II species (migratory fish and freshwater pearl mussel)	Increases in suspended sediment concentrations and deposition of disturbed sediments to the seabed due to planting activities and seabed sampling.	✓	*	*
	Temporary habitat disturbance from planting activities and seabed sampling.	✓	*	*
	Accidental pollution.	✓	✓	*
Annex II species (marine mammals)	Increased vessel traffic during planting activities may result in an increase in disturbance to or collision risk with marine mammals.	✓	*	*
	Increased vessel traffic during monitoring activities may result in an increase in disturbance to or collision risk with marine mammals.	*	✓	*

Receptor Type	Potential Effect	Installation/ Construction	Implementation/ Operation/ Maintenance	Decommissioning
	Accidental pollution.	✓	✓	✗
Offshore and Intertidal Ornithology	The impact of planting activities such as increased vessel activity or planting in intertidal area on foot may result in direct disturbance or displacement from important foraging and habitat areas of birds.	✓	✗	✗
	The impact of monitoring activities such as increased vessel activity or monitoring of the intertidal area on foot may result in disturbance or displacement from important foraging and habitat areas of birds.	✗	✓	✗
	Accidental pollution.	✓	✓	✗
<b>Predator eradication</b>				
Onshore Ecology	Temporary disturbance through access to undertake predator eradication.	✗	✓	✗
	Temporary habitat disturbance from construction / demolition.	✓	✗	✓
	Impacts to non-target predator species (i.e. species not known to be detrimental to guillemots and/or razorbills). Potential impacts could occur via consumption of dead poisoned targeted predators or direct ingestion of poison.	✓	✓	✗
<b>Bycatch Reduction technology</b>				
Annex I habitats (designated benthic habitats)	Existing commercial fisheries activity in the area represents the baseline against which any additional impacts as a result of the bycatch measures are considered.	✗	✗	✗
	No additional impacts are predicted as a result of the bycatch measures.			
Annex II species (migratory fish and freshwater pearl mussel)	Existing commercial fisheries activity in the area represents the baseline against which any additional impacts as a result of the bycatch measures are considered.	✗	✗	✗
	No additional impacts are predicted as a result of the bycatch measures.			
Annex II species (marine mammals)	Existing commercial fisheries activity in the area represents the baseline against which any additional impacts as a result of the bycatch measures are considered.	✗	✗	✗
	No additional impacts are predicted as a result of the bycatch measures.			
Offshore and Intertidal Ornithology	Existing commercial fisheries activity in the area represents the baseline against which any additional impacts as a result of the bycatch measures are considered.	✗	✗	✗
	No additional impacts are predicted as a result of the bycatch measures.			

## 2.3.3 Identification of Sites and Features for Screening

2.3.3.1 In order to identify the sites to be considered for screening, the AoS for each Compensation Measure have been analysed using Geographic Information System (GIS mapping). Sites have been identified by applying the following filters:

- Sites with Annex I features (designated benthic habitats) – within AoS plus 20 km buffer;
- Sites with Annex II species (designated migratory fish feature and/or freshwater pearl mussel feature) - within the AoS plus 100 km buffer;
- Sites with Annex II species (designated marine mammal feature) where the relevant species Management Unit (MU) has physical overlap with the AoS;
- Sites with a designated seabird, wader or wildfowl feature (offshore and intertidal ornithology) feature within the AoS;
- Onshore - sites within a 2km buffer of the AoS have been included, extending to a 5km buffer for sites with bird or bat features.

2.3.3.2 Information on all designated sites identified in this process are provided in [Appendix B](#).

## 2.3.4 Screening for potential LSE

2.3.4.1 The site selection process documented in [Section 2.3.3](#) generated a list of designated sites and relevant features for which there is a need to consider the potential for LSE in relation to each Hornsea Four Compensation Measure. In addition, in [Table 4](#), the likely effects that may result from all phases of each Hornsea Four Compensation Measure (and are relevant to the receptors being considered here) have been identified to enable these to be considered. The screening process combines that information for the project alone and presents the assessment of potential LSE to provide the necessary information for Stage 1 of the HRA process. Where potential for LSE applies alone, it is assumed that potential for LSE applies in-combination.

2.3.4.2 It should be noted that the effects identified for each of the Compensation Measures do not automatically correlate to a potential LSE with respect to one or more designated feature. For an effect to manifest, the receptor needs to be sensitive and there needs to be a pathway. The conclusions on Stage 1 screening, in relation to the identified sites and designated feature(s), are presented in [Section 3](#) to [Section 6](#) for each Compensation Measure, with the codes outlined in [Table 5](#) being used to summarise the conclusions of the screening, drawing on the relevant information available for the designated sites (provided in [Appendix B](#)).

**Table 5: Parameters applied to conclude Potential for LSE.**

Table Code	Consideration of Potential LSE
A	There is no pathway to connect the effect to this feature and therefore there is no potential for LSE.
B	The feature is not sensitive to the effect and therefore there is no potential for LSE.
C	Until a works location is finalised, a potential pathway to connect the effect to this feature cannot be ruled out and therefore there is a potential for LSE.



## 2.4 Approach to Appropriate Assessment (HRA Stage 2)

- 2.4.1.1 Where the Screening process concludes the potential for a LSE, then there is a requirement for an AA (Stage 2). Stage 1 Screening for the Hornsea Four Compensation Measures has identified the possibility of LSE for certain features and effects. The required Stage 2 AA will be conducted by the SoS, with the information necessary to inform that assessment provided within this document in [Section 3](#) to [Section 6](#) for each Compensation Measure.
- 2.4.1.2 With respect to the assessment in-combination, it is assumed that where potential for LSE applies alone then potential for LSE applies in-combination ([paragraph 2.3.1.2](#)). However, until locations for Compensation Measures are finalised, it is not possible to identify relevant plans and projects to include within an in-combination assessment. As previously noted, the Applicant will comply with the relevant consenting and licensing requirements to implement each Compensation Measure as appropriate, which will include carrying out a HRA at that time, if required.
- 2.4.1.3 It should be noted, however, that ultimately, the Compensation Measures will not be consented through the Hornsea Four DCO application process and so far as applicable, will be subject to standalone EIA and HRA processes as part of their own consenting process (for example a Marine Licence application and/or Planning Application). As part of that consenting process, further assessment work will be undertaken, including consideration of in-combination effects, based on refined design and methodology details.

## **3 Habitats Regulations Assessment – New Offshore Artificial Nesting Structure**

### **3.1 Assessment of the Potential for Likely Significant Effect (LSE) - New Offshore Artificial Nesting Structure**

- 3.1.1.1 Screening for potential LSE considers the effects that may result during installation/ construction, implementation/ operation/ maintenance and decommissioning of the new offshore artificial nesting structure Compensation Measure, as defined in [Section 2.3.2](#), in relation to the designated sites identified in [Section 2.3.3](#). This section combines that information to determine the potential LSE for the project alone. Key to the potential for LSE are the clear presence or absence of a pathway, linking the effect to a designated site or feature, together with known sensitivity of the feature to the effect. The conclusions on the potential for LSE are presented in [Table 6](#), on a site by site basis.

Table 6: Screening based on potential LSE from New Offshore Artificial Nesting Structure in the southern North Sea AoS (A1).

Designated Site	Receptor Types	Features Identified for Screening	Relevant Effect(s)			Consideration of Potential LSE	Conclusion of Potential LSE
			Installation/Construction	Implementation/Operation/Maintenance	Decommissioning		
Haisborough, Hammond and Winterton SAC	Annex I habitats (designated benthic habitats)	<ul style="list-style-type: none"> <li>Sandbanks which are slightly covered by sea water all the time, and Reefs.</li> </ul>	<ul style="list-style-type: none"> <li>Temporary habitat loss/disturbance and direct damage by jack-up vessels and seabed preparation;</li> <li>Increases in suspended sediment concentrations and deposition of disturbed sediments to the seabed due to seabed preparation and drilling for foundation installation; and</li> <li>Accidental pollution.</li> </ul>	<ul style="list-style-type: none"> <li>Accidental pollution;</li> <li>Long term loss of seabed habitat through presence of foundations and scour protection, resulting in potential effects on benthic receptors;</li> <li>Maintenance operations may result in temporary seabed disturbances and potential effects on benthic ecology;</li> <li>Colonisation of foundations and scour protection may affect benthic ecology and biodiversity; and</li> <li>Increased risk of introduction or spread of invasive and non-native species due to presence of subsea infrastructure, scour protection and vessel movements (e.g. ballast water).</li> </ul>	<ul style="list-style-type: none"> <li>Accidental pollution;</li> <li>Temporary loss of habitat due to operations to remove structure, and associated jack-up operations;</li> <li>Temporary increases in suspended sediment concentrations and deposition from removal of structure; and</li> <li>Removal of foundation leading to loss of species/habitats colonising the structure.</li> </ul>	C	<b>Potential for LSE</b>
North Norfolk Sandbanks and Saturn Reef SAC	Annex I habitats (designated benthic habitats)	<ul style="list-style-type: none"> <li>Sandbanks which are slightly covered by sea water all the time; and</li> <li>Reefs.</li> </ul>	<ul style="list-style-type: none"> <li>Temporary habitat loss/disturbance and direct damage by jack-up vessels and seabed preparation;</li> <li>Increases in suspended sediment concentrations and deposition of disturbed sediments to the seabed due to seabed preparation and drilling for foundation installation; and</li> <li>Accidental pollution.</li> </ul>	<ul style="list-style-type: none"> <li>Accidental pollution;</li> <li>Long term loss of seabed habitat through presence of foundations and scour protection, resulting in potential effects on benthic receptors;</li> <li>Maintenance operations may result in temporary seabed disturbances and potential effects on benthic ecology;</li> <li>Colonisation of foundations and scour protection may affect benthic ecology and biodiversity; and</li> <li>Increased risk of introduction or spread of invasive and non-native species due to presence of subsea infrastructure, scour protection and vessel movements (e.g. ballast water).</li> </ul>	<ul style="list-style-type: none"> <li>Accidental pollution;</li> <li>Temporary loss of habitat due to operations to remove structure, and associated jack-up operations;</li> <li>Temporary increases in suspended sediment concentrations and deposition from removal of structure; and</li> <li>Removal of foundation leading to loss of species/habitats colonising the structure.</li> </ul>	C	<b>Potential for LSE</b>

## 3.2 Assessment of Adverse Effect Alone – Information to Inform Appropriate Assessment (New Offshore Artificial Nesting Structure)

- 3.2.1.1 Where potential for LSE on a European site(s) has been identified, there is a requirement to consider whether that potential effect(s) will adversely affect the integrity of the site in view of its conservation objectives (Figure 9). The potential for LSE for the new offshore artificial nesting structure Compensation Measure is presented in Table 6. Potential for LSE applies where a feature is known to be sensitive to the effect and a potential pathway cannot be discounted.
- 3.2.1.2 The approach taken to HRA for the Compensation Measures is summarised in Figure 10. Where the screening conclusion is that there is a potential LSE, the primary measure applied to avoid an AEol is mitigation. For Hornsea Four, these measures are identified in the A4.5.2: Commitments Register (REP6-008), with the commitments relevant to offshore compensation measures provided in Table 7 for ease of reference. It should be noted, however, that ultimately, the Compensation Measures will not be consented through the Hornsea Four DCO application process and will be subject to (where necessary) standalone EIA and HRA processes as part of their own consenting process (for example a Marine Licence application and/or Planning Application). As part of that consenting process, further assessment work will be undertaken, based on refined design and methodology details.
- 3.2.1.3 The information to inform the AA for the new offshore artificial nesting structure Compensation Measure is presented in Table 8; the table details all designated sites, features and effects for which a potential for LSE has been identified, proposes appropriate Commitments (mitigation) that could be applied to avoid or reduce the impacts, and provides conclusions on whether there is potential for AEol after the application of these Commitments for the project alone. Consideration to AEol in-combination is made in Section 9.

**Table 7: Commitment tables relating to offshore compensation measures.**

Commitment Reference	Commitment Details
CoC-OFF-1	NERC habitats of principal importance will be avoided (where possible) through the undertaking of survey works pre-construction.
CoC-OFF-2	A Marine Written Scheme of Archaeological Investigation (WSI) will be developed. The Marine WSI will include the requirement for Archaeological Exclusion Zones (AEZs) to be established to protect any known / identified / unexpected marine archaeological receptors and the implementation of a Protocol for Archaeological Discoveries (PAD) in accordance with 'Protocol for Archaeological Discoveries: Offshore Renewables Projects' (The Crown Estate, 2014).
CoC-OFF-3	Advance warning and accurate location details of construction, maintenance and decommissioning operations, associated Safety Zones and advisory passing distances will be given via Notices to Mariners and Kingfisher Bulletins.
CoC-OFF-4	A Vessel Management Plan (VMP) will be developed pre-construction which will determine vessel routing to and from construction areas and ports to minimise, as far as reasonably practicable, encounters with marine mammals and ornithological receptors.
CoC-OFF-5	The Defence Infrastructure Organisation and the Civil Aviation Authority (CAA) will be informed of the locations, heights and lighting status of structures, 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.



Commitment Reference	Commitment Details
<b>CoC-OFF-6</b>	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.
<b>CoC-OFF-7</b>	A Project Environmental Management and Monitoring Plan (PEMMP) will be developed, if required
<b>CoC-OFF-8</b>	Fish Habitat Enhancement site selection will be limited to areas of degraded/former seagrass and/or locations within an Annex I feature and/or citation that includes seagrass as its ecological characteristics.
<b>CoC-OFF-9</b>	Presence of habitats of principal importance (Section 41 of the 2006 Natural Environment and Rural Communities (NERC) Act) will be identified through a review of the latest available benthic datasets and pre-construction surveys. Foundations will be micro-sited around habitats of principal importance wherever reasonably practicable (subject to agreement with the MMO) to an extent not resulting in a hazard for marine traffic and Search & Rescue capability.
<b>CoC-OFF-10</b>	A piling Marine Mammal Mitigation Protocol (MMMP) will be developed in accordance with the Outline MMMP and will be implemented during construction. The piling MMMP will include measures to ensure the risk of instantaneous permanent threshold shift (PTS) to marine mammals is negligible and will be in line with the latest relevant available guidance. The piling MMMP will include details of soft starts to be used during piling operations with lower hammer energies used at the beginning of the piling sequence before increasing energies to the higher levels.
<b>CoC-OFF-11</b>	Ongoing liaison with fishing fleets will be maintained during construction, maintenance and decommissioning operations via an appointed Fisheries Liaison Officer and Fishing Industry Representative.
<b>CoC-OFF-12</b>	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.
<b>CoC-OFF-13</b>	Compensation Measures will not be co-located in immediate proximity (within an appropriate buffer) to oil and gas or carbon capture and storage infrastructure, aggregate dredging or disposal sites, or cables and pipelines.
<b>CoC-OFF-14</b>	Offshore geotechnical and geophysical surveys (including a UXO survey) will be undertaken prior to construction, including a staged geoarchaeological assessment and will be subject to a full archaeological review in consultation with Historic England.
<b>CoC-OFF-15</b>	Hornsea Four will ensure compliance with MGN654 where appropriate. This includes completion of an MGN 645 Search and Rescue Checklist in consultation with the MCA.

Table 8: Assessment of AEol Alone for New Offshore Artificial Nesting Structure.

AoS	Site	Feature	Project Phase			Effect	Relevant Commitment	Potential for AEol
			C	O	D			
A1: Southern North Sea	Haisborough, Hammond and Winterton SAC	<ul style="list-style-type: none"> <li>Sandbanks which are slightly covered by sea water all the time, and</li> <li>Reefs.</li> </ul>	✓	✗	✗	• Temporary habitat loss/disturbance and direct damage by jack-up vessels and seabed preparation.	CoC-OFF-1	As a result of the implementation of CoC-OFF-1, there is <b>no potential for AEol</b> .
			✓	✗	✗	• Increases in suspended sediment concentrations and deposition of disturbed sediments to the seabed due to seabed preparation and drilling for foundation installation.	CoC-OFF-7	As a result of the implementation of CoC-OFF-7, there is <b>no potential for AEol</b> .
			✓	✓	✓	• Accidental pollution.	CoC-OFF-7	As a result of the implementation of CoC-OFF-7, there is <b>no potential for AEol</b> .
			✗	✓	✗	• Long term loss of seabed habitat through presence of foundations and scour protection, resulting in potential effects on benthic receptors.	CoC-OFF-9	As a result of the implementation of CoC-OFF-9, there is <b>no potential for AEol</b> .
			✗	✓	✗	• Maintenance operations may result in temporary seabed disturbances and potential effects on benthic ecology	CoC-OFF-1	As a result of the implementation of CoC-OFF-1, there is <b>no potential for AEol</b> .
			✗	✓	✗	• Colonisation of foundations and scour protection may affect benthic ecology and biodiversity.	CoC-OFF-7	As a result of the implementation of CoC-OFF-7, there is <b>no potential for AEol</b> .
			✗	✓	✗	• Increased risk of introduction or spread of invasive and non-native species due to presence of subsea infrastructure, scour protection and vessel movements (e.g. ballast water).	CoC-OFF-7	As a result of the implementation of CoC-OFF-7, there is <b>no potential for AEol</b> .
			✗	✗	✓	• Temporary loss of habitat due to operations to remove structure, and associated jack-up operations.	N/A	The requirement for, and the exact nature of decommissioning the nesting structure, will be determined in consultation with the relevant authorities towards the end of the 35-year operational life of Hornsea Four. Risk of impact would be managed in line with best practice at that time. Therefore, there is <b>no potential for AEol</b> .
			✗	✗	✓	• Temporary increases in suspended sediment concentrations and deposition from removal of structure.	N/A	The requirement for, and the exact nature of decommissioning the nesting structure, will be determined in consultation with the relevant authorities towards the end of the 35-year operational life of Hornsea Four. Risk of impact would be managed in line with best practice at that time. Therefore, there is <b>no potential for AEol</b> .
A1: Southern North Sea	North Norfolk Sandbanks and Saturn Reef SAC	<ul style="list-style-type: none"> <li>Sandbanks which are slightly covered by sea water all the time; and</li> <li>Reefs</li> </ul>	✓	✗	✗	• Temporary habitat loss/disturbance and direct damage by jack-up vessels and seabed preparation.	CoC-OFF-1	As a result of the implementation of CoC-OFF-1, there is <b>no potential for AEol</b> .
			✓	✗	✗	• Increases in suspended sediment concentrations and deposition of disturbed sediments to the seabed due to seabed preparation and drilling for foundation installation.	CoC-OFF-7	As a result of the implementation of CoC-OFF-7, there is <b>no potential for AEol</b> .
			✓	✓	✓	• Accidental pollution.	CoC-OFF-7	As a result of the implementation of CoC-OFF-7, there is <b>no potential for AEol</b> .
			✗	✓	✗	• Long term loss of seabed habitat through presence of foundations and scour protection, resulting in potential effects on benthic receptors.	CoC-OFF-9	As a result of the implementation of CoC-OFF-9, there is <b>no potential for AEol</b> .
			✗	✓	✗	• Maintenance operations may result in temporary seabed disturbances and potential effects on benthic ecology.	CoC-OFF-1	As a result of the implementation of CoC-OFF-1, there is <b>no potential for AEol</b> .

AoS	Site	Feature	Project Phase			Effect	Relevant Commitment	Potential for AEol
			C	O	D			
			*	✓	*	<ul style="list-style-type: none"> <li>Colonisation of foundations and scour protection may affect benthic ecology and biodiversity.</li> </ul>	CoC-OFF-7	As a result of the implementation of CoC-OFF-7, there is <b>no potential for AEol</b> .
			*	✓	*	<ul style="list-style-type: none"> <li>Increased risk of introduction or spread of invasive and non-native species due to presence of subsea infrastructure, scour protection and vessel movements (e.g. ballast water).</li> </ul>	CoC-OFF-7	As a result of the implementation of CoC-OFF-7, there is <b>no potential for AEol</b> .
			*	*	✓	<ul style="list-style-type: none"> <li>Temporary loss of habitat due to operations to remove structure, and associated jack-up operations.</li> </ul>	N/A	The requirement for, and the exact nature of decommissioning the nesting structure, will be determined in consultation with the relevant authorities towards the end of the 35-year operational life of Hornsea Four. Risk of impact would be managed in line with best practice at that time. Therefore, there is <b>no potential for AEol</b> .
			*	*	✓	<ul style="list-style-type: none"> <li>Temporary increases in suspended sediment concentrations and deposition from removal of structure.</li> </ul>	N/A	The requirement for, and the exact nature of decommissioning the nesting structure, will be determined in consultation with the relevant authorities towards the end of the 35-year operational life of Hornsea Four. Risk of impact would be managed in line with best practice at that time. Therefore, there is <b>no potential for AEol</b> .
			*	*	✓	<ul style="list-style-type: none"> <li>Removal of foundations leading to loss of species/habitats colonising the structure.</li> </ul>	N/A	The requirement for, and the exact nature of decommissioning the nesting structure, will be determined in consultation with the relevant authorities towards the end of the 35-year operational life of Hornsea Four. Risk of impact would be managed in line with best practice at that time. Therefore, there is <b>no potential for AEol</b> .

## 4 Habitats Regulations Assessment – Repurposed Offshore Artificial Nesting Structure

### 4.1 Assessment of the Potential for LSE - Repurposed Offshore Artificial Nesting Structure

- 4.1.1.1 Screening for potential LSE considers the effects that may result during installation/ construction, implementation/ operation/ maintenance and decommissioning of the repurposed offshore artificial nesting structure Compensation Measure, as defined in [Section 2.3.2](#), in relation to the designated sites identified in [Section 2.3.3](#). This section combines that information to determine the potential LSE for the project alone. Key to the potential for LSE are the clear presence or absence of a pathway, linking the effect to a designated site or feature, together with known sensitivity of the feature to the effect. The conclusions on the potential for LSE are presented in [Table 9](#), on a site-by-site basis and to reflect the refined Areas of Search for Offshore Nesting and relevant designated sites.
- 4.1.1.2 The assessment of potential LSE is made based on three clear parameters, as defined in [Table 5](#). The presence or absence of a pathway is based on the scope and nature of the proposed Compensation Measure activities together with the location of the designated feature, with the sensitivity of the feature(s) drawing on the relevant information available for the designated sites (provided in [Appendix B](#)).



Table 9: Screening based on potential LSE from Repurposed Offshore Artificial Nesting Structure in the southern North Sea AoS (A1).

Designated Site	Receptor Types	Features Identified for Screening	Relevant effect(s)			Consideration of Potential LSE	Conclusion of Potential LSE
			Installation/Construction	Implementation/Operation/Maintenance	Decommissioning		
Hainsborough, Hammond and Winterton SAC	Annex I habitats (designated benthic habitats)	<ul style="list-style-type: none"> <li>Sandbanks which are slightly covered by sea water all the time, and</li> <li>Reefs.</li> </ul>	<ul style="list-style-type: none"> <li>Accidental pollution; and</li> <li>Temporary habitat loss/disturbance and direct damage by jack-up vessels</li> </ul>	<ul style="list-style-type: none"> <li>Accidental pollution; and</li> <li>Maintenance operations may result in temporary seabed disturbances and potential effects on benthic ecology.</li> </ul>	<ul style="list-style-type: none"> <li>Accidental pollution;</li> <li>Temporary loss of habitat due to operations to remove structure and associated jack-up operations resulting in potential effects on benthic ecology;</li> <li>Temporary increases in suspended sediment concentrations and deposition from removal of structure resulting in potential effects on benthic ecology; and</li> <li>Removal of foundation leading to loss of species/ habitats colonising the structure.</li> </ul>	C	<b>Potential for LSE</b>
North Norfolk Sandbanks and Saturn Reef SAC	Annex I habitats (designated benthic habitats)	<ul style="list-style-type: none"> <li>Sandbanks which are slightly covered by sea water all the time; and</li> <li>Reefs</li> </ul>	<ul style="list-style-type: none"> <li>Accidental pollution; and</li> <li>Temporary habitat loss/disturbance and direct damage by jack-up vessels</li> </ul>	<ul style="list-style-type: none"> <li>Accidental pollution; and</li> <li>Maintenance operations may result in temporary seabed disturbances and potential effects on benthic ecology.</li> </ul>	<ul style="list-style-type: none"> <li>Accidental pollution;</li> <li>Temporary loss of habitat due to operations to remove structure and associated jack-up operations resulting in potential effects on benthic ecology;</li> <li>Temporary increases in suspended sediment concentrations and deposition from removal of structure resulting in potential effects on benthic ecology; and</li> <li>Removal of foundation leading to loss of species/ habitats colonising the structure.</li> </ul>	C	<b>Potential for LSE</b>

## 4.2 Assessment of Adverse Effect Alone – Information to Inform Appropriate Assessment (Repurposed Offshore Artificial Nesting Structure)

- 4.2.1.1 Where potential for LSE on a European site(s) has been identified, there is a requirement to consider whether that potential effect(s) will adversely affect the integrity of the site in view of its conservation objectives ([Figure 9](#)). The potential for LSE for the repurposed offshore artificial nesting structure Compensation Measure is presented in [Table 9](#). Potential for LSE applies where a feature is known to be sensitive to the effect and a potential pathway cannot be discounted.
- 4.2.1.2 The approach taken to HRA for the Compensation Measures is summarised in [Figure 10](#). Where the screening conclusion is that there is a potential LSE, the primary measure applied to avoid an AEol is mitigation. For Hornsea Four, these measures are identified in [Volume A4.5.2: Commitments Register \(REP6-008\)](#), with the commitments relevant to offshore compensation measures provided in [Table 7](#) for ease of reference. It should be noted, however, that ultimately, the Compensation Measures will not be consented through the Hornsea Four DCO application process and will be subject to (where necessary) standalone EIA and HRA processes as part of their own consenting process (for example a Marine Licence application and/or Planning Application). As part of that consenting process, further assessment work will be undertaken, based on refined design and methodology details.
- 4.2.1.3 The information to inform the AA for the repurposed offshore artificial nesting structure Compensation Measure is presented in [Table 10](#); the table details all designated sites, features and effects for which a potential for LSE has been identified, proposes appropriate Commitments (mitigation) that could be applied to avoid or reduce the impacts, and provides conclusions on whether there is potential for AEol after the application of these Commitments for the project alone. Consideration to AEol in-combination is made in [Section 9](#).

Table 10: Assessment of AEol Alone for Repurposed Offshore Artificial Nesting Structure.

AoS	Site	Feature	Project Phase			Effect	Relevant Commitment	Potential for AEol
			C	O	D			
A1: Southern North Sea	Haisborough, Hammond and Winterton SAC	<ul style="list-style-type: none"> <li>Sandbanks which are slightly covered by sea water all the time; and</li> <li>Reefs.</li> </ul>	✓	✗	✗	<ul style="list-style-type: none"> <li>Temporary habitat loss/disturbance and direct damage by jack-up vessels.</li> </ul>	CoC-OFF-1	As a result of the implementation of CoC-OFF-1 and the impact being highly limited in extent and duration, there is <b>no potential for AEol.</b>
			✓	✓	✓	<ul style="list-style-type: none"> <li>Accidental pollution.</li> </ul>	CoC-OFF-7	As a result of the implementation of CoC-OFF-7 and the impact being highly limited in extent and duration, there is <b>no potential for AEol.</b>
			✗	✓	✗	<ul style="list-style-type: none"> <li>Maintenance operations may result in temporary seabed disturbances and potential effects on benthic ecology.</li> </ul>	CoC-OFF-1	As a result of the implementation of CoC-OFF-1 and the impact being highly limited in extent and duration, there is <b>no potential for AEol.</b>
			✗	✗	✓	<ul style="list-style-type: none"> <li>Temporary loss of habitat due to operations to remove structure and associated jack-up operations resulting in potential effects on benthic ecology.</li> </ul>	CoC-OFF-1	The requirement for, and the exact nature of decommissioning the nesting structure, will be determined in consultation with the relevant authorities towards the end of the 35-year operational life of Hornsea Four. Risk of impact would be managed in line with best practice at that time. Therefore, there is <b>no potential for AEol.</b>
			✗	✗	✓	<ul style="list-style-type: none"> <li>Temporary increases in suspended sediment concentrations and deposition from removal of structure resulting in potential effects on benthic ecology.</li> </ul>	N/A	The requirement for, and the exact nature of decommissioning the nesting structure, will be determined in consultation with the relevant authorities towards the end of the 35-year operational life of Hornsea Four. Risk of impact would be managed in line with best practice at that time. Therefore, there is <b>no potential for AEol.</b>

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AoS	Site	Feature	Project Phase			Effect	Relevant Commitment	Potential for AEol
			C	O	D			
			*	*	✓	<ul style="list-style-type: none"> <li>Removal of foundation leading to loss of species/ habitats colonising the structure.</li> </ul>	N/A	The requirement for, and the exact nature of decommissioning the nesting structure, will be determined in consultation with the relevant authorities towards the end of the 35-year operational life of Hornsea Four. Risk of impact would be managed in line with best practice at that time. Therefore, there is <b>no potential for AEol</b> .
kinA1: Southern North Sea	North Norfolk Sandbanks and Saturn Reef SAC	<ul style="list-style-type: none"> <li>Sandbanks which are slightly covered by sea water all the time; and</li> <li>Reefs</li> </ul>	✓	*	*	<ul style="list-style-type: none"> <li>Temporary habitat loss/disturbance and direct damage by jack-up vessels.</li> </ul>	CoC-OFF-1	As a result of the implementation of CoC-OFF-1 and the impact being highly limited in extent and duration, there is <b>no potential for AEol</b> .
			✓	✓	✓	<ul style="list-style-type: none"> <li>Accidental pollution.</li> </ul>	CoC-OFF-7	As a result of the implementation of CoC-OFF-7 and the impact being highly limited in extent and duration, there is <b>no potential for AEol</b> .
			*	✓	*	<ul style="list-style-type: none"> <li>Maintenance operations may result in temporary seabed disturbances and potential effects on benthic ecology.</li> </ul>	CoC-OFF-1	As a result of the implementation of CoC-OFF-1 and the impact being highly limited in extent and duration, there is <b>no potential for AEol</b> .
			*	*	✓	<ul style="list-style-type: none"> <li>Temporary loss of habitat due to operations to remove structure and associated jack-up operations resulting in potential effects on benthic ecology.</li> </ul>	CoC-OFF-1	The requirement for, and the exact nature of decommissioning the nesting structure, will be determined in consultation with the relevant authorities towards the end of the 35-year operational life of Hornsea Four. Risk of impact would be managed in line with best practice at that time. Therefore, there is <b>no potential for AEol</b> .
			*	*	✓	<ul style="list-style-type: none"> <li>Temporary increases in suspended sediment concentrations and</li> </ul>	N/A	The requirement for, and the exact nature of decommissioning the nesting structure, will be

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AoS	Site	Feature	Project Phase			Effect	Relevant Commitment	Potential for AEol
			C	O	D			
						deposition from removal of structure resulting in potential effects on benthic ecology.		determined in consultation with the relevant authorities towards the end of the 35-year operational life of Hornsea Four. Risk of impact would be managed in line with best practice at that time. Therefore, there is <b>no potential for AEol.</b>
			*	*	✓	<ul style="list-style-type: none"> <li>Removal of foundation leading to loss of species/ habitats colonising the structure.</li> </ul>	N/A	The requirement for, and the exact nature of decommissioning the nesting structure, will be determined in consultation with the relevant authorities towards the end of the 35-year operational life of Hornsea Four. Risk of impact would be managed in line with best practice at that time. Therefore, there is <b>no potential for AEol.</b>



## 5 Habitats Regulations Assessment – New Onshore Artificial Nesting Structure

### 5.1 Assessment of the Potential for LSE - New Onshore Artificial Nesting Structure

- 5.1.1.1 The identification of site and features process (described in [Section 2.3.3](#)) generated a list of designated sites (sites designated for their geological interest, i.e. that have no ecological/ornithological interest, have been excluded) and relevant features for which there is a need to consider the potential for LSE in relation to the new onshore artificial nesting structure Compensation Measure. In addition, in [Section 2.3.2](#), the likely effects that may result during installation/construction, implementation/operation and decommissioning of new onshore artificial nesting structure Compensation Measure (and are relevant to the receptors being considered here) were identified to enable these to be considered. This section combines that information for the project alone and presents the assessment of potential LSE for the project alone with the information presented in [Table 11](#) for Cayton Bay to Newbiggin by the Sea AoS (B1).
- 5.1.1.2 The assessment of potential LSE is made based on three clear parameters, as defined in [Table 5](#). The presence or absence of a pathway is based on the scope and nature of the proposed Compensation Measure activities together with the location of the designated feature, with the sensitivity of the feature(s) drawing on the relevant information available for the designated sites (provided in [Appendix B](#)).

**Table 11: Screening based on potential LSE from New Onshore Artificial Nesting Structure in Cayton Bay to Newbiggin by the Sea AoS (B1).**

Designated Site	Receptor Types	Features Identified for Screening	Relevant effect(s)			Consideration of Potential LSE	Conclusion of Potential LSE
			Installation/Construction	Implementation/Operation/Maintenance	Decommissioning		
<b>Northumbria Coast SPA and Ramsar site</b>	Onshore ornithology	<ul style="list-style-type: none"> <li>Breeding populations of Artic tern and Little tern and non-breeding populations of Purple sandpiper and Turnstone</li> </ul>	<ul style="list-style-type: none"> <li>Disturbance to protected species from vegetation clearance (if required) resulting in habitat loss and fragmentation.</li> <li>Disturbance to protected species from temporary site lighting.</li> <li>Increase in noise and vibration to ecological receptors due to HGV movements associated with delivery of pre-fabricated structure or construction of structure and/or access track.</li> <li>Loss of supporting habitat within the footprint of the structure.</li> </ul>	<ul style="list-style-type: none"> <li>Changes to habitat in area contained by fencing due to increased nutrient concentrations from guano.</li> <li>Loss of supporting habitat within the footprint of the structure.</li> </ul>	<ul style="list-style-type: none"> <li>Disturbance to protected species from temporary site lighting.</li> <li>Disturbance to protected species from vegetation clearance required for decommissioning.</li> <li>Increase in noise and vibration to ecological receptors due to HGV movements associated with decommissioning activities</li> </ul>	C	<b>Potential for LSE</b>
<b>Durham Coast SAC</b>	Annex I Habitats	<ul style="list-style-type: none"> <li>Vegetated sea cliffs of the Atlantic and Baltic coasts</li> </ul>	<ul style="list-style-type: none"> <li>Potential for dust generation and nitrogen deposition at designated sites from</li> </ul>	<ul style="list-style-type: none"> <li>Changes to habitat in area contained by fencing due to decreased nutrient concentrations from guano and removal of fencing.</li> </ul>	<ul style="list-style-type: none"> <li>Potential for dust generation and nitrogen deposition at designated sites</li> </ul>	C	<b>Potential for LSE</b>

Designated Site	Receptor Types	Features Identified for Screening	Relevant effect(s)			Consideration of Potential LSE	Conclusion of Potential LSE
			Installation/Construction	Implementation/Operation/Maintenance	Decommissioning		
			<p>HGVs and construction plant.</p> <ul style="list-style-type: none"> <li>• Potential for habitat loss and/or destruction due to construction access and compound.</li> </ul>		<p>from HGVs and decommissioning plant.</p> <ul style="list-style-type: none"> <li>• Potential for habitat loss and/or destruction due to decommissioning activities.</li> </ul>		
<p><b>Teesmouth and Cleveland Coast SPA and Ramsar site</b></p>	<p>Onshore ornithology</p>	<ul style="list-style-type: none"> <li>• Habitats supporting nationally and internationally important breeding and non-breeding birds</li> </ul>	<ul style="list-style-type: none"> <li>• Disturbance to protected species from vegetation clearance (if required) resulting in habitat loss and fragmentation.</li> <li>• Disturbance to protected species from temporary site lighting.</li> <li>• Increase in noise and vibration to ecological receptors due to HGV movements associated with delivery of pre-fabricated structure or construction of structure and/or access track.</li> </ul>	<ul style="list-style-type: none"> <li>• Changes to habitat in area contained by fencing due to increased nutrient concentrations from guano.</li> <li>• Loss of supporting habitat within the footprint of the structure.</li> </ul>	<ul style="list-style-type: none"> <li>• Disturbance to protected species from temporary site lighting.</li> <li>• Disturbance to protected species from vegetation clearance required for decommissioning.</li> <li>• Increase in noise and vibration to ecological receptors due to HGV movements associated with</li> </ul>	<p>C</p>	<p><b>Potential for LSE</b></p>

Designated Site	Receptor Types	Features Identified for Screening	Relevant effect(s)			Consideration of Potential LSE	Conclusion of Potential LSE
			Installation/Construction	Implementation/Operation/Maintenance	Decommissioning		
			<ul style="list-style-type: none"> <li>Loss of supporting habitat within the footprint of the structure.</li> </ul>		decommissioning activities		
<b>Beast Cliff</b> <b>Whitby Robin</b> <b>Hood's Bay</b> <b>SAC</b>	Annex I Habitats	<ul style="list-style-type: none"> <li>Vegetated sea cliffs of the Atlantic and Baltic coasts</li> </ul>	<ul style="list-style-type: none"> <li>Potential for dust generation and nitrogen deposition at designated sites from HGVs and construction plant.</li> <li>Potential for habitat loss and/or destruction due to construction access and compound.</li> </ul>	<ul style="list-style-type: none"> <li>Changes to habitat in area contained by fencing due to increased nutrient concentrations from guano and removal of fencing.</li> </ul>	<ul style="list-style-type: none"> <li>Changes to habitat in area contained by fencing due to increased nutrient concentrations from guano and removal of fencing.</li> <li>Potential for dust generation and nitrogen deposition at designated sites from HGVs and decommissioning plant.</li> <li>Potential for habitat loss and/or destruction due to decommissioning activities.</li> </ul>	C	<b>Potential for LSE</b>

Designated Site	Receptor Types	Features Identified for Screening	Relevant effect(s)			Consideration of Potential LSE	Conclusion of Potential LSE
			Installation/Construction	Implementation/Operation/Maintenance	Decommissioning		
<b>Castle Eden Dene SAC</b>	Annex I Habitats	<ul style="list-style-type: none"> <li>• Taxus baccata woods of the British Isles</li> </ul>	<ul style="list-style-type: none"> <li>• Potential for dust generation and nitrogen deposition at designated sites from HGVs and construction plant.</li> <li>• Potential for habitat loss and/or destruction due to construction access and compound.</li> </ul>	<ul style="list-style-type: none"> <li>• Changes to habitat in area contained by fencing due to increased nutrient concentrations from guano and removal of fencing.</li> </ul>	<ul style="list-style-type: none"> <li>• Changes to habitat in area contained by fencing due to increased nutrient concentrations from guano and removal of fencing.</li> <li>• Potential for dust generation and nitrogen deposition at designated sites from HGVs and decommissioning plant.</li> <li>• Potential for habitat loss and/or destruction due to decommissioning activities.</li> </ul>	C	<b>Potential for LSE</b>



## 5.2 Assessment of Adverse Effect Alone – Information to Inform Appropriate Assessment (New Onshore Artificial Nesting Structure)

- 5.2.1.1 Where potential for LSE on a European site(s) has been identified, there is a requirement to consider whether that potential effect(s) will adversely affect the integrity of the site in view of its conservation objectives (Figure 9). The potential for LSE for the new onshore artificial nesting structure Compensation Measure is presented in Table 11. Potential for LSE applies where a feature is known to be sensitive to the effect and a potential pathway cannot be discounted.
- 5.2.1.2 The approach taken to HRA for the Compensation Measures is summarised in Figure 10. Where the screening conclusion is that there is a potential LSE, the primary measure applied to avoid an AEol is mitigation. For Hornsea Four, these measures are identified in A4.5.2: Commitments Register (REP6-008), with the commitments relevant to onshore compensation measures provided in Table 12 for ease of reference. It should be noted, however, that ultimately, the Compensation Measures will not be consented through the Hornsea Four DCO application process and will be subject to (where necessary) standalone EIA and HRA processes as part of their own consenting process (for example a Marine Licence application and/or Planning Application). As part of that consenting process, further assessment work will be undertaken, based on refined design and methodology details.
- 5.2.1.3 The information to inform the AA for the new onshore artificial nesting structure Compensation Measure is presented in Table 13; the table details all designated sites, features and effects for which a potential for LSE has been identified, proposes appropriate Commitments (mitigation) that could be applied to avoid or reduce the impacts, and provides conclusions on whether there is potential for AEol after the application of these Commitments for the project alone. Consideration to AEol in-combination is made in Section 9.

**Table 12 Commitment tables relating to onshore compensation measures.**

Commitment Reference	Commitment Details
CoC-ON-1	Consideration of the timing and location of predator eradication programme will be made to ensure that it is undertaken at the optimal time/location and that it will not affect a non-target species. Design of eradication programme and eradication methods will follow current good practise design to minimise impact on sensitive habitats, non target species and disruption to land use.
CoC-ON-2	Appropriate liaison will take place with the Lead Local Flood Authority/Internal Drainage Board during construction.
CoC-ON-3	If requested by Lead Local Flood Authority/Internal Drainage Board, a Construction Drainage Scheme will be implemented for the onshore compensation works in accordance with the Outline Onshore Infrastructure Drainage Strategy. The Construction Drainage Scheme would ensure that existing land drainage is maintained during construction and would identify specific drainage measures for each area of land based on information identified and recorded by a Land Drainage Consultant prior to construction. The Construction Drainage Scheme would be developed in consultation with landowners, the Lead Local Flood Authority, the Environment Agency and relevant Internal Drainage Board.
CoC-ON-4	If requested by Lead Local Flood Authority/Internal Drainage Board, a Construction Drainage Scheme will be implemented for Onshore Infrastructure Drainage Strategy for the

Commitment Reference	Commitment Details
	<p>permanent onshore compensation in accordance with the Outline Onshore Infrastructure Drainage Strategy. The Onshore Infrastructure Drainage Strategy would include measures to ensure that existing land drainage is reinstated and/or maintained. The Onshore Infrastructure Drainage Strategy would be developed in line with the latest relevant drainage guidance notes in consultation with the Environment Agency, Lead Local Flood Authority and relevant Internal Drainage Board as appropriate.</p>
<b>CoC-ON-5</b>	<p>Topsoil and subsoil will be stored in separate stockpiles in line with DEFRA Construction Code of Practice for the Sustainable Use of Soils on Construction Sites PB13298 or the latest relevant available guidance. Any suspected or confirmed contaminated soils will be appropriately separated, contained and tested before removal (if required).</p>
<b>CoC-ON-6</b>	<p>Post-construction, the working area will be reinstated to pre-existing condition as far as practical in line with DEFRA 2009 Construction Code of Practice for the Sustainable Use of Soils on Construction Sites PB13298 or latest relevant available guidance.</p>
<b>CoC-ON-7</b>	<p>All logistics compounds will be removed and sites will be reinstated when construction has been completed.</p>
<b>CoC-ON-9</b>	<p>Appropriate Personal Protective Equipment (PPE) will be used and relevant good working practices applied to avoid potential risk to human health from any potential ground contamination, in line with relevant available guidance.</p>
<b>CoC-ON-10</b>	<p>Where reasonably practicable the design of all temporary access tracks within the floodplain of EA Main rivers (defined as areas of Flood Zone 2 and 3, as shown on the Environment Agency Flood Map for Planning), areas at risk of surface water flooding (as shown on the Risk of Flooding Surface Water maps), or in areas included on the historic flood map (from any source) will replicate or be as consistent with existing ground levels as possible, to limit any effects on future flood risk.</p>
<b>CoC-ON-11</b>	<p>Site selection will avoid track or nesting structure locations where river or major water course crossings are required</p>
<b>CoC-ON-12</b>	<p>A contaminated land and groundwater scheme will be prepared to identify any contamination and any remedial measures which may be required.</p>
<b>CoC-ON-13</b>	<p>Where hedgerows and/or trees require removal, this will be undertaken prior to topsoil removal. Sections of hedgerows and trees which are removed will be replaced using like for like hedgerow species.</p>
<b>CoC-ON-14</b>	<p>Trees identified to be retained within the Onshore Crossing Schedule will be fenced off and worked around. Where works are required close to trees that will remain in situ, techniques will be used to safeguard the root protection zone.</p>
<b>CoC-ON-15</b>	<p>All vegetation requiring removal will be undertaken outside of the bird breeding season. If this is not reasonably practicable, the vegetation requiring removal will be subject to a nesting bird check by a suitably qualified Ecological Clerk of Works (ECoW). If nesting birds are present, the vegetation will not be removed until the young have fledged or the nest failed.</p>
<b>CoC-ON-16</b>	<p>Where required, provision will be made for badger access in relevant construction areas, when work is not taking place in order to ensure normal movements as far as reasonably</p>

Commitment Reference	Commitment Details
	possible. Provision will be made to ensure avoiding the entrapment of any animals within relevant construction areas. Checks will be made prior to the start of any works to ensure no animals are trapped. Appropriate checks will be made as required by the ECoW.
<b>CoC-ON-17</b>	All ponds identified during the site selection process will be avoided where possible. During construction newly identified ponds will be avoided where reasonably practicable.
<b>CoC-ON-18</b>	Construction site lighting will only operate when required and will be positioned and directed to avoid unnecessary illumination to residential properties, sensitive ecological receptors, footpath users, and minimise glare to users of adjoining public highways. Construction site lighting will be designed in accordance with latest relevant available guidance and legislation and the details of the location, height, design and luminance of lighting to be used will be detailed within documents submitted as part of the Planning Application. The design of construction site lighting will accord with the details provided in the Outline Code of Construction Practice and Outline Ecological Management Plan.
<b>CoC-ON-19</b>	Good practice air quality management measures will be applied where human receptors reside within 350 m of works or ecological receptors are present within 200 m, as described in Institute of Air Quality Management (IAQM) Guidance on the Assessment of Dust from Demolition and Construction 2014, version 1.1, or latest relevant available guidance.
<b>CoC-ON-21</b>	Where agreed with landowners, removed hedgerows and trees will be replaced with hedgerows of a more diverse and locally native species composition than that which was removed
<b>CoC-ON-22</b>	The development of an Written Scheme of Investigation (WSI) for Onshore Archaeology will be considered in line with an Outline Written Scheme of Onshore Archaeological Written Scheme of Investigation (WSI) for Onshore Archaeology. The onshore WSI would detail the survey and archaeological mitigation requirements in advance of and during construction.
<b>CoC-ON-23</b>	HGV movements associated with operation and planned maintenance of the onshore infrastructure will operate only between the hours of 0700 – 2300. HGV movements may however be subject to unscheduled maintenance activities outside these hours. In this event the council will be informed via writing.
<b>CoC-ON-24</b>	A Construction Traffic Management Plan (CTMP) will be developed in accordance with the outline CTMP to be submitted with the planning application. The CTMP will set standards and procedures for: <ol style="list-style-type: none"> <li>1. Managing the numbers and routing of HGVs during the construction phase;</li> <li>2. Managing the movement of employee traffic during the construction phase;</li> <li>3. Details of localised road improvements necessary to facilitate safe use of the existing road network; and</li> <li>4. Details of measures to manage the safe passage of HGV traffic via the local highway network.</li> </ol>
<b>CoC-ON-27</b>	Where reasonably practicable, topsoil & subsoil stockpiling within the floodplain (defined as areas of Flood Zone 2 or 3 as identified on the Environment Agency Flood Map for Planning) of any EA Main River will be avoided.
<b>CoC-ON-28</b>	Loss of ALC 2 and 3 to be avoided if possible. If not, agreement will be reached with landowner.

Commitment Reference	Commitment Details
CoC-ON-29	As far as possible, contaminated sites will be avoided. If not possible, remediation measures will be implemented.
CoC-ON-30	A range of sensitive historical, cultural and ecological conservation areas (including statutory and non-statutory designations) will be directly avoided by the permanent footprint. These include, but are not restricted to: Listed Buildings; Scheduled Monuments; Registered Parks and Gardens; Onshore Conservation Areas; Onshore National Site Network; Sites of Special Scientific Interest; Local Nature Reserves; Local Wildlife sites; Royal Society for the Protection of Birds (RSPB) Reserves; Heritage Coast; National Trust land; Ancient Woodland and known Tree Preservation Orders (TPOs); non-designated built heritage assets; and historic landfill. Where possible, unprotected areas of woodland, mature and protected trees (i.e. veteran trees) will also be avoided.
CoC-ON-31	Good practice guidance detailed in the Environment Agency's Pollution Prevention Guidance (PPG) notes (including PPG01, PPG05, PPG08 and PPG21) will be followed where appropriate, or the latest relevant available guidance.
CoC-ON-32	Engagement with community in relation to potential impacts and site selection via a remote/online Community Liaison Officer.
CoC-ON-33	Implementation of the use of Best Available Techniques (BAT), appropriate measures, due diligence or all reasonable precautions to minimise noise and odour.
CoC-ON-34	During construction of piled foundations, the following guidance will be used: Piling and Penetrative Ground Improvement Methods on land Affected by Contamination: Guidance on Pollution Prevention (Environment Agency, 2001), or latest relevant available guidance.
CoC-ON-35	Annual monitoring and remedial works through adherence to a habitat management plan.
CoC-ON-37	A monitoring plan will be developed as part of the operation and maintenance procedures which will set standards and procedures for: <ol style="list-style-type: none"> <li>1. Managing the numbers and routing of monitoring visits during the operation phase;</li> <li>2. Managing the movement of employee traffic during the operation phase;</li> <li>3. Details of how to facilitate safe use of the existing road network; and</li> <li>4. Details of measures to manage the safe passage of monitoring traffic via the local highway network.</li> </ol>
CoC-ON-38	Biosecurity measures such as a rodent quarantine and contingency plan will be developed which minimises the risk of rats being re-introduced.
CoC-ON-39	A site selection and onshore nesting project implementation plan will be created in consultation with regulators, stakeholders and local community. Stakeholders and the local community will be informed three months prior to construction starting. Onshore nesting project implementation plan to be submitted via the Town and Country Planning Act (TCPA) if required.
CoC-ON-40	Site selection will avoid track or nesting structure locations within 100m (or suitable buffer) of a waterbody (as defined by Water Framework Directive (WFD) or pond.
CoC-ON-41	Design of eradication programme and eradication methods will follow current good practise design to minimise impact on sensitive habitats, non target species and disruption to land use.
CoC-ON-42	A screening planting scheme to reduce impact on setting from sensitive views will be implemented.

Commitment Reference	Commitment Details
<b>CoC-ON-43</b>	A carefully designed habitat enhancement plan will be produced and agreed with regulators prior to implementation. Community and stakeholder consultation will be part of the habitat enhancement plan process.
<b>CoC-ON-44</b>	HGV movements within designated sites will be avoided where possible.
<b>CoC-ON-45</b>	Priority habitat will be avoided during site selection process.



**Table 13: Assessment of AEol Alone for New Onshore Artificial Nesting Structure.**

Site	Feature	Project Phase			Effect	Relevant Commitment	Potential for AEol
		C	O	D			
Northumbria Coast SPA, Ramsar	<ul style="list-style-type: none"> <li>Breeding populations of Artic tern and Little tern and non-breeding populations of Purple sandpiper and Turnstone</li> </ul>	✓	✗	✓	<ul style="list-style-type: none"> <li>Disturbance to protected species from vegetation clearance (if required) resulting in habitat loss and fragmentation.</li> </ul>	CoC-ON-13 CoC-ON-14 COC-ON-15 CoC-ON-17 CoC-ON-35	As a result of the implementation of commitments to reinstate lost habitat (CoC-ON-13 and CoC-ON-14), to consider the timing of the vegetation removal (CoC-ON-15), avoid ponds (CoC-ON-17) and adherence to annual monitoring and remedial works via a habitat management plan (CoC-ON-35), the magnitude of impact on Artic tern, Little tern, Purple sandpiper and Turnstone would be limited in extent and duration. Therefore, there is <b>no potential for AEol</b> .
		✓	✗	✓	<ul style="list-style-type: none"> <li>Disturbance to protected species from temporary site lighting.</li> </ul>	CoC-ON-18	As a result of the implementation of commitments to limit construction site lighting (CoC-ON-18), the magnitude of impact on Artic tern, Little tern, Purple sandpiper and Turnstone would be limited in extent and duration. Therefore, there is <b>no potential for AEol</b> .
		✓	✗	✓	<ul style="list-style-type: none"> <li>Increase in noise and vibration to ecological receptors due to HGV movements associated with delivery of pre-fabricated structure or construction of structure, and construction of access track.</li> </ul>	CoC-ON-23 CoC-ON-39	As a result of the implementation of commitments to limit HGV movements (CoC-ON-23) and application of an onshore nesting project implementation plan (CoC-ON-39), the magnitude of impact on Artic tern, Little tern, Purple sandpiper and Turnstone would be limited in extent and duration. Therefore, there is <b>no potential for AEol</b> .
		✗	✓	✗	<ul style="list-style-type: none"> <li>Changes to habitat in area contained by fencing due to increased nutrient concentrations from guano and removal of fencing.</li> </ul>	CoC-ON-35 CoC-ON-45	As a result of the implementation of commitments to adhere to annual monitoring and remedial works via a habitat management plan (CoC-ON-35) and avoidance of priority habitat (CoC-ON-45), the magnitude of impact on Artic tern, Little tern, Purple sandpiper and Turnstone would be limited in extent and duration. Therefore, there is <b>no potential for AEol</b> .

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Site	Feature	Project Phase			Effect	Relevant Commitment	Potential for AEol
		C	O	D			
		✓	✓	*	<ul style="list-style-type: none"> <li>Loss of supporting habitat within the footprint of the structure.</li> </ul>	CoC-ON-30 CoC-ON-45	The magnitude of effect associated with the permanent footprint of the onshore artificial nesting structures is considered to be minor as the area required under the Maximum Design Parameters is 0.04ha. In addition, as a result of the implementation of commitments including avoidance of statutory and non-statutory designations (CoC-ON-30) and avoidance of priority habitat (CoC-ON-45), the magnitude of impact on habitat would be limited in extent given its footprint (0.04ha). Therefore, there is <b>no potential for AEol</b> .
Durham Coast SSSI, SAC	<ul style="list-style-type: none"> <li>Vegetated sea cliffs of the Atlantic and Baltic coasts</li> </ul>	✓	*	✓	<ul style="list-style-type: none"> <li>Potential for dust generation and nitrogen deposition at designated sites from HGVs and construction plant.</li> </ul>	CoC-ON-19 CoC-ON-30 CoC-ON-43	As a result of the implementation of commitments to good practice air quality management measures (CoC-ON-19), avoidance of statutory and non-statutory designations (CoC-ON-30) and habitat enhancement (CoC-ON-43), the magnitude of impact on vegetated sea cliffs would be limited in extent and duration. Therefore, there is <b>no potential for AEol</b> .
		✓	*	✓	<ul style="list-style-type: none"> <li>Potential for habitat loss and/or destruction due to construction and decommissioning activities.</li> </ul>	CoC-ON-7 CoC-ON-30 CoC-ON-44 CoC-ON-45	As a result of the implementation of commitments to reinstate logistics compounds (CoC-ON-7), avoidance of statutory and non-statutory designations (CoC-ON-30), limiting HGV movement within designated sites (CoC-ON-44) and avoidance of priority habitat (CoC-ON-45), the magnitude of impact on vegetated sea cliffs would be limited in extent and duration. Therefore, there is <b>no potential for AEol</b> .
		*	✓	*	<ul style="list-style-type: none"> <li>Changes to habitat in area contained by fencing due to increased nutrient concentrations from guano and removal of fencing.</li> </ul>	CoC-ON-35 CoC-ON-45	As a result of the implementation of commitments to adhere to annual monitoring and remedial works via a habitat management plan (CoC-ON-35) and avoidance of priority habitat (CoC-ON-45), the magnitude of impact on vegetated sea cliffs would be limited in extent and duration. Therefore, there is <b>no potential for AEol</b> .
		✓	*	✓	<ul style="list-style-type: none"> <li>Potential for dust generation and nitrogen deposition at</li> </ul>	CoC-ON-19 CoC-ON-30	As a result of the implementation of commitments to good practice air quality management measures (CoC-ON-19),

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Site	Feature	Project Phase			Effect	Relevant Commitment	Potential for AEol
		C	O	D			
					designated sites from HGVs and decommissioning plant.	CoC-ON-43	avoidance of statutory and non-statutory designations (CoC-ON-30) and habitat enhancement (CoC-ON-43). the magnitude of impact on vegetated sea cliffs would be limited in extent and duration. Therefore, there is <b>no potential for AEol</b> .
Teesmouth and Cleveland Coast SPA, Ramsar	• Habitats supporting nationally and internationally important breeding and non-breeding birds	✓	✗	✓	• Disturbance to protected species from vegetation clearance (if required) resulting in habitat loss and fragmentation.	CoC-ON-13 CoC-ON-14 CoC-ON-15 CoC-ON-17 CoC-ON-35	As a result of the implementation of commitments to reinstate lost habitat (CoC-ON-13 and CoC-ON-14), to consider the timing of the vegetation removal (CoC-ON-15), avoid ponds (CoC-ON-17) and adherence to annual monitoring and remedial works via a habitat management plan (CoC-ON-35), the magnitude of impact on habitats supporting nationally and internationally important breeding and non-breeding birds would be limited in extent and duration. Therefore, there is <b>no potential for AEol</b> .
		✓	✗	✓	• Disturbance to protected species from temporary site lighting.	CoC-ON-18	As a result of the implementation of commitments to limit construction site lighting (CoC-ON-18), the magnitude of impact on habitats supporting nationally and internationally important breeding and non-breeding birds would be limited in extent and duration. Therefore, there is <b>no potential for AEol</b> .
		✓	✗	✓	• Increase in noise and vibration to ecological receptors due to HGV movements associated with delivery of pre-fabricated structure or construction of structure, and construction of access track.	CoC-ON-23 CoC-ON-39	As a result of the implementation of commitments to limit HGV movements (CoC-ON-23) and application of an onshore nesting project implementation plan (CoC-ON-39), the magnitude of impact on habitats supporting nationally and internationally important breeding and non-breeding birds would be limited in extent and duration. Therefore, there is <b>no potential for AEol</b> .
		✗	✓	✗	• Changes to habitat in area contained by fencing due to increased nutrient concentrations from guano and removal of fencing.	CoC-ON-35 CoC-ON-45	As a result of the implementation of commitments to adhere to annual monitoring and remedial works via a habitat management plan (CoC-ON-35) and avoidance of priority habitat (CoC-ON-45), the magnitude of impact on habitats supporting nationally and internationally important breeding

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Site	Feature	Project Phase			Effect	Relevant Commitment	Potential for AEol
		C	O	D			
							and non-breeding birds would be limited in extent and duration. Therefore, there is <b>no potential for AEol</b> .
		✓	✓	*	<ul style="list-style-type: none"> <li>Loss of supporting habitat within the footprint of the structure.</li> </ul>	CoC-ON-30 CoC-ON-45	The magnitude of effect associated with the permanent footprint of the onshore artificial nesting structures is considered to be minor as the area required under the Maximum Design Parameters is 0.04ha. In addition, as a result of the implementation of commitments including avoidance of statutory and non-statutory designations (CoC-ON-30) and avoidance of priority habitat (CoC-ON-45), the magnitude of impact on habitat would be limited in extent given its footprint (0.04ha). Therefore, there is <b>no potential for AEol</b> .
Beast Cliff Whitby Robin Hood's SAC	<ul style="list-style-type: none"> <li>Vegetated sea cliffs</li> </ul>	✓	*	✓	<ul style="list-style-type: none"> <li>Potential for dust generation and nitrogen deposition at designated sites from HGVs and construction plant.</li> </ul>	CoC-ON-19 CoC-ON-30 CoC-ON-43	As a result of the implementation of commitments to good practice air quality management measures (CoC-ON-19), avoidance of statutory and non-statutory designations (CoC-ON-30) and habitat enhancement (CoC-ON-43), the magnitude of impact on vegetated sea cliffs would be limited in extent and duration. Therefore, there is <b>no potential for AEol</b> .
		✓	*	✓	<ul style="list-style-type: none"> <li>Potential for habitat loss and/or destruction due to construction and decommissioning activities.</li> </ul>	CoC-ON-7 CoC-ON-30 CoC-ON-44 CoC-ON-45	As a result of the implementation of commitments to reinstate logistics compounds (CoC-ON-7), avoidance of statutory and non-statutory designations (CoC-ON-30), limiting HGV movement within designated sites (CoC-ON-44) and avoidance of priority habitat (CoC-ON-45), the magnitude of impact on vegetated sea cliffs would be limited in extent and duration. Therefore, there is <b>no potential for AEol</b> .
		*	✓	*	<ul style="list-style-type: none"> <li>Changes to habitat in area contained by fencing due to increased nutrient concentrations from guano and removal of fencing.</li> </ul>	CoC-ON-35 CoC-ON-45	As a result of the implementation of commitments to adhere to annual monitoring and remedial works via a habitat management plan (CoC-ON-35) and avoidance of priority habitat (CoC-ON-45), the magnitude of impact on vegetated sea cliffs would be limited in extent and duration. Therefore, there is <b>no potential for AEol</b> .

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Site	Feature	Project Phase			Effect	Relevant Commitment	Potential for AEol
		C	O	D			
Castle Eden Dene SAC	• Woodland, grassland and nationally and regionally rare invertebrates	✓	✗	✓	• Potential for dust generation and nitrogen deposition at designated sites from HGVs and construction plant.	CoC-ON-19 CoC-ON-30 CoC-ON-43	As a result of the implementation of commitments to good practice air quality management measures (CoC-ON-19), avoidance of statutory and non-statutory designations (CoC-ON-30) and habitat enhancement (CoC-ON-43), the magnitude of impact on habitats supporting regionally rare invertebrates would be limited in extent and duration and therefore <b>no potential for AEol</b> .
		✓	✗	✓	• Potential for habitat loss and/or destruction due to construction and decommissioning activities.	CoC-ON-7 CoC-ON-30 CoC-ON-44 CoC-ON-45	As a result of the implementation of commitments to reinstate logistics compounds (CoC-ON-7), avoidance of statutory and non-statutory designations (CoC-ON-30), limiting HGV movement within designated sites (CoC-ON-44) and avoidance of priority habitat (CoC-ON-45), the magnitude of impact on habitats supporting regionally rare invertebrates would be limited in extent and duration. Therefore, there is <b>no potential for AEol</b> .
		✗	✓	✗	• Changes to habitat in area contained by fencing due to decreased nutrient concentrations from guano and removal of fencing.	CoC-ON-35 CoC-ON-45	As a result of the implementation of commitments to adhere to annual monitoring and remedial works via a habitat management plan (CoC-ON-35) and avoidance of priority habitat (CoC-ON-45), the magnitude of impact on habitats supporting regionally rare invertebrates would be limited in extent and duration. Therefore, there is <b>no potential for AEol</b> .



## 6 Habitats Regulations Assessment – Bycatch Reduction Technology

### 6.1 Assessment of the Potential for LSE - Bycatch Reduction Technology

6.1.1.1 Screening for potential LSE considers the effects that may result during installation/ construction, implementation/ O&M and decommissioning of the Bycatch Reduction Technology Compensation Measure, as defined in [Section 2.3.2](#), in relation to the designated sites identified in [Section 2.3.3](#). The outcome of this process determined that there are no predicted effects that are likely to impact any receptor group. Therefore, it has been concluded that there is no potential for LSE for any site or receptor with respect to this Compensation Measure.

### 6.2 Assessment of Adverse Effect Alone – Information to Inform Appropriate Assessment (Bycatch Reduction Technology)

6.2.1.1 Where potential for LSE on a European site(s) has been identified, there is a requirement to consider whether that potential effect(s) will adversely affect the integrity of the site in view of its conservation objectives ([Figure 20](#)). Potential for LSE applies where a feature is known to be sensitive to the effect and a potential pathway cannot be discounted. As no potential for LSE was identified at any site, there is no potential for AEol anticipated and there are no commitments designed for this Compensation Measure.

6.2.1.2 The conclusions on potential for LSE in all cases therefore mean that the Bycatch Reduction Technology Compensation Measure does not need to progress to Stage 2 AA and no assessment of the potential for AEol is made alone. The lack of any pathway for the effect alone means no potential for any contribution to an AEol in-combination.

## 7 Habitats Regulations Assessment – Predator Eradication

### 7.1 Assessment of the Potential for LSE - Predator Eradication

- 7.1.1.1 Screening for potential LSE considers the effects that may result during installation/ construction, implementation/operation/ maintenance and decommissioning of the predator eradication Compensation Measure, as defined in [Section 2.3.2](#), in relation to the designated sites identified in [Section 2.3.3](#). This section combines that information to determine the potential LSE for the project alone. Key to the potential for LSE are the clear presence or absence of a pathway, linking the effect to a designated site or feature, together with known sensitivity of the feature to the effect. The conclusions on the potential for LSE are presented in [Table 14](#), on a site by site basis.
- 7.1.1.2 The assessment of potential LSE is made based on three clear parameters, as defined in [Table 5](#). The presence or absence of a pathway is based on the scope and nature of the proposed Compensation Measure activities together with the location of the designated feature, with the sensitivity of the feature(s) drawing on the relevant information available for the designated sites (provided in [Appendix B](#)).

**Table 14: Screening based on potential LSE from Predator Eradication at Bailiwick of Guernsey AoS (D1).**

Designated Site	Receptor Types	Features Identified for Screening	Relevant effect(s)			Consideration of Potential LSE	Conclusion of Potential LSE
			Installation/Construction	Implementation/Operation/Maintenance	Decommissioning		
Gouliot Caves and Headland Ramsar	Terrestrial habitats and fauna	<ul style="list-style-type: none"> <li>Wetlands, coastal grasslands and rocky shores supporting a wide variety of invertebrates</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Impacts to non-target predator species (i.e. species not known to be detrimental to guillemots and/or razorbills). Potential impacts could occur via consumption of dead poisoned targeted predators or direct ingestion of poison.</li> <li>Habitat disturbance and/or loss due to increased human activity due to implementation of eradication programme e.g. regular setting of baits or traps and monitoring work.</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	C	<b>Potential for LSE</b>
Herm, Jethou and The Humps Ramsar	Onshore ornithology	<ul style="list-style-type: none"> <li>Habitats supporting nine species of breeding seabirds</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Impacts to non-target predator species (i.e. species not known to be detrimental to guillemots and/or razorbills). Potential impacts could occur via consumption of dead poisoned targeted predators or direct ingestion of poison.</li> <li>Habitat disturbance and/or loss due to increased human activity due to implementation of eradication programme e.g. regular setting of baits or traps and monitoring work.</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	C	<b>Potential for LSE</b>
Lihou Island and l'Érée Headland Ramsar	Terrestrial habitats, Offshore ornithology	<ul style="list-style-type: none"> <li>Seagrass bed, coastal grasslands and habitat supporting</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> <li></li> <li></li> </ul>	<ul style="list-style-type: none"> <li>Impacts to non-target predator species (i.e. species not known to be detrimental to guillemots and/or razorbills). Potential impacts could occur via consumption of dead poisoned targeted predators or direct ingestion of poison.</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	A	<b>No potential for LSE</b>

		five species of breeding birds		<ul style="list-style-type: none"> <li>Habitat disturbance and/or loss due to increased human activity due to implementation of eradication programme e.g. regular setting of baits or traps and monitoring work.</li> </ul>			
West Coast and Burhou Islands Ramsar	Offshore ornithology	<ul style="list-style-type: none"> <li>Seagrass bed and habitat supporting five species of breeding birds</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Impacts to non-target predator species (i.e. species not known to be detrimental to guillemots and/or razorbills). Potential impacts could occur via consumption of dead poisoned targeted predators or direct ingestion of poison.</li> <li>Habitat disturbance and/or loss due to increased human activity due to implementation of eradication programme e.g. regular setting of baits or traps and monitoring work.</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	C	<b>Potential for LSE</b>

## 7.2 Assessment of Adverse Effect Alone – Information to Inform Appropriate Assessment (Predator Eradication)

- 7.2.1.1 Where potential for LSE on a European site(s) has been identified, there is a requirement to consider whether that potential effect(s) will adversely affect the integrity of the site in view of its conservation objectives ([Figure 9](#)). The potential for LSE for the predator eradication Compensation Measure is presented above in [Table 14](#). Potential for LSE applies where a feature is known to be sensitive to the effect and a potential pathway cannot be discounted.
- 7.2.1.2 The approach taken to HRA for the Compensation Measures is summarised in [Figure 10](#). Where the screening conclusion is that there is a potential LSE, the primary measure applied to avoid an AEol is mitigation. For Hornsea Four, these measures are identified in [Volume A45.2: Commitments Register, REP6-008](#), with the commitments relevant to onshore compensation measures provided in [Table 12](#) for ease of reference. It should be noted, however, that ultimately, the Compensation Measures will not be consented through the Hornsea Four DCO application process and will be subject to (where necessary) standalone EIA and HRA processes as part of their own consenting process (for example a Marine Licence application and/or Planning Application). As part of that consenting process, further assessment work will be undertaken, based on refined design and methodology details.
- 7.2.1.3 The information to inform the AA for the predator eradication Compensation Measure is presented in [Table 15](#); the table details all designated sites, features and effects for which a potential for LSE has been identified, proposes appropriate Commitments (mitigation) that could be applied to avoid or reduce the impacts, and provides conclusions on whether there is potential for AEol after the application of these Commitments for the project alone. Consideration to AEol in-combination is made in [Section 9](#).



Table 15: Assessment of AEol Alone for Predator Eradication.

Site	Feature	Project Phase			Effect	Relevant Commitment	Potential for AEol
		C	O	D			
Gouliot Caves and Headland Ramsar	Wetlands, coastal grasslands and rocky shores supporting a wide variety of invertebrates	*	✓	*	Impacts to non-target predator species ( i.e. species not known to be detrimental to guillemots and/or razorbills). Potential impacts could occur via consumption of dead poisoned targeted predators or direct ingestion of poison.	CoC-ON-41 CoC-ON-1	As a result of the implementation of commitments (CoC-ON-1 and CoC-ON-41) to minimise disturbance in line with good practice and to consider the timing of the eradication programme the magnitude of impact on non-target species would be limited in extent and duration. Therefore <b>no potential for AEol</b> .
		*	✓	*	Habitat disturbance due to increased human activity due to implementation of eradication programme e.g. regular setting of baits or traps and monitoring work.	CoC-ON-41 CoC-ON-1	As a result of the implementation of commitments (CoC-ON-1 and CoC-ON-41) to minimise disturbance in line with good practice and to consider the timing of the eradication programme the magnitude of impact on wetland, coastal grassland and rocky shore habitats would be limited in extent and duration. Therefore <b>no potential for AEol</b> .
Herm, Jethou and The Humps Ramsar	Habitats supporting nine species of breeding seabirds	*	✓	*	Impacts to non-target predator species ( i.e. species not known to be detrimental to guillemots and/or razorbills). Potential impacts could occur via consumption of dead poisoned targeted predators or direct ingestion of poison.	CoC-ON-41 CoC-ON-1	As a result of the implementation of commitments (CoC-ON-1 and CoC-ON-41) to minimise disturbance in line with good practice and to consider the timing of the eradication programme the magnitude of impact on species of breeding seabird species would be limited in extent and duration. Therefore, <b>no potential for AEol</b> .
		*	✓	*	Habitat disturbance due to increased human activity due to implementation of eradication programme e.g. regular setting of baits or traps and monitoring work.	CoC-ON-41 CoC-ON-1	As a result of the implementation of commitments (CoC-ON-1 and CoC-ON-41) to minimise disturbance in line with good practice and to consider the timing of the eradication programme the magnitude of impact on habitats supporting breeding seabirds would be limited in extent and duration. Therefore, <b>no potential for AEol</b> .
West Coast and Burhou Islands Ramsar	Seagrass bed and habitat supporting five species of breeding birds	*	✓	*	Impacts to non-target predator species (i.e. species not known to be detrimental to guillemots and/or razorbills). Potential impacts could occur via consumption of	CoC-ON-41 CoC-ON-1	As a result of the implementation of commitments (CoC-ON-1 and CoC-ON-41) to minimise disturbance in line with good practice and to consider the timing of the eradication programme the magnitude of impact on species of

Site	Feature	Project Phase			Effect	Relevant Commitment	Potential for AEol
		C	O	D			
					<p>dead poisoned targeted predators or direct ingestion of poison.</p> <p>Habitat disturbance due to increased human activity due to implementation of eradication programme e.g. regular setting of baits or traps and monitoring work.</p>	<p>CoC-ON-41</p> <p>CoC-ON-1</p>	<p>breeding seabird species would be limited in extent and duration. Therefore, <b>no potential for AEol.</b></p> <p>As a result of the implementation of commitments (CoC-ON-1 and CoC-ON-41) to minimise disturbance in line with good practice and to consider the timing of the eradication programme the magnitude of impact on species of breeding seabird species would be limited in extent and duration. Therefore, <b>no potential for AEol.</b></p>

# Hornsea 4

## **8 Habitats Regulations Assessment – Resilience Measure – Fish Habitat Enhancement (Seagrass)**

### **8.1 Assessment of the Potential for LSE - Resilience Measure – Fish Habitat Enhancement (Seagrass)**

- 8.1.1.1 Screening for potential LSE considers the effects that may result during installation/ construction, implementation/ operation/ maintenance and decommissioning of the fish habitat enhancement (seagrass) Compensation Measure, as defined in [Section 2.3.2](#), in relation to the designated sites identified in [Section 2.3.3](#). This section combines that information to determine the potential LSE for the project alone. Key to the potential for LSE are the clear presence or absence of a pathway, linking the effect to a designated site or feature, together with known sensitivity of the feature to the effect. The conclusions on the potential for LSE are presented in [Table 16](#), on a site-by-site basis.
- 8.1.1.2 It is assumed that any onshore access to the area chosen for fish habitat enhancement will be through existing highways and/or footpaths. It is considered that no new access roads will be required and that no construction is required as part of the measure. Any requirement for vehicle movements during site suitability surveys, the restoration process or subsequent monitoring are considered to be negligible. Therefore, onshore impacts have been scoped out of the assessment.
- 8.1.1.3 The assessment of potential LSE is made based on three clear parameters, as defined in [Table 5](#). The presence or absence of a pathway is based on the scope and nature of the proposed Compensation Measure activities together with the location of the designated feature, with the sensitivity of the feature(s) drawing on the relevant information available for the designated sites (provided in [Appendix B](#)).

**Table 16: Screening based on potential LSE from Fish Habitat Enhancement (Seagrass) at the Humber Estuary AoS (E1).**

Designated Site	Receptor Types	Features Identified for Screening	Relevant effect(s)			Consideration of Potential LSE	Conclusion of Potential LSE
			Installation/Construction	Implementation/Operation	Decommissioning		
Humber Estuary Ramsar	Annex I habitats (designated benthic habitats)	<ul style="list-style-type: none"> <li>Ramsar criterion 1: The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons.</li> </ul>	<ul style="list-style-type: none"> <li>Temporary habitat disturbance from planting activities and seabed sampling;</li> <li>Increases in suspended sediment concentrations and deposition of disturbed sediments to the seabed due to planting activities and seabed sampling; and.</li> <li>Accidental pollution.</li> </ul>	<ul style="list-style-type: none"> <li>Change of habitat type following introduction or reinstatement of seagrass; and</li> <li>Accidental pollution.</li> </ul>	N/A	C	Potential for LSE
	Annex II species for primary selection (marine mammals)	<ul style="list-style-type: none"> <li>Ramsar criterion 3: The Humber Estuary Ramsar site supports a breeding colony of grey seals <i>Halichoerus grypus</i> at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast.</li> </ul>	<ul style="list-style-type: none"> <li>Increased vessel traffic during planting activities may result in an increase in disturbance to or collision risk with marine mammals; and</li> <li>Accidental pollution.</li> </ul>	<ul style="list-style-type: none"> <li>Increased vessel traffic during monitoring activities may result in an increase in disturbance to or collision risk with marine mammals; and</li> <li>Accidental pollution.</li> </ul>	N/A	C	Potential for LSE
	Annex II species for primary selection (migratory fish species)	<ul style="list-style-type: none"> <li>Ramsar criterion 8: The Humber Estuary acts as an important migration route for both river lamprey (<i>Lampetra fluviatilis</i>) and sea lamprey (<i>Petromyzon marinus</i>) between coastal waters and their spawning areas.</li> </ul>	<ul style="list-style-type: none"> <li>Increases in suspended sediment concentrations and deposition of disturbed sediments to the seabed due to planting activities and seabed sampling;</li> <li>Temporary habitat disturbance from planting activities and seabed sampling; and</li> <li>Accidental pollution.</li> </ul>	<ul style="list-style-type: none"> <li>Accidental pollution.</li> </ul>	N/A	C	Potential for LSE
	Offshore and Intertidal Ornithology	<ul style="list-style-type: none"> <li>Ramsar criterion 5: Assemblages of international importance: 153,934 waterfowl, non-breeding season (5 year peak mean 1996/97-2000/2001); and</li> <li>Ramsar criterion 6: species/populations occurring at levels of international importance: Common shelduck, <i>Tadorna tadorna</i>, Eurasian golden plover, <i>Pluvialis apricaria</i>, <i>altifrons</i>, Red knot, <i>Calidris canutus islandica</i>, Dunlin, <i>Calidris alpina alpina</i>, Black-tailed godwit, <i>Limosa limosa islandica</i>, Bar-tailed godwit, <i>Limosa lapponica lapponica</i>, and Common redshank, <i>Tringa totanus</i>.</li> </ul>	<ul style="list-style-type: none"> <li>The impact of planting activities such as increased vessel activity or planting in intertidal area on foot may result in direct disturbance or displacement from important foraging and habitat areas of birds; and</li> <li>Accidental pollution.</li> </ul>	<ul style="list-style-type: none"> <li>The impact of monitoring activities such as increased vessel activity or monitoring of the intertidal area on foot may result in disturbance or displacement from important foraging and habitat areas of birds; and</li> <li>Accidental pollution.</li> </ul>	N/A	C	Potential for LSE
Humber Estuary SAC	Annex I habitats (designated benthic habitats)	<ul style="list-style-type: none"> <li>Estuaries;</li> <li>Mudflats and sandflats not covered by seawater at low tide;</li> <li>Sandbanks which are slightly covered by sea water all the time;</li> <li>Coastal lagoons (*Priority feature);</li> <li>Salicornia and other annuals colonizing mud and sand and;</li> <li>Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>).</li> </ul>	<ul style="list-style-type: none"> <li>Temporary habitat disturbance from planting activities and seabed sampling;</li> <li>Increases in suspended sediment concentrations and deposition of disturbed sediments to the seabed due to planting activities and seabed sampling; and.</li> <li>Accidental pollution.</li> </ul>	<ul style="list-style-type: none"> <li>Change of habitat type following introduction or reinstatement of seagrass; and</li> <li>Accidental pollution.</li> </ul>	N/A	C	Potential for LSE
	Annex II species for primary selection (migratory fish species)	<ul style="list-style-type: none"> <li>Sea lamprey, <i>Petromyzon marinus</i>;</li> <li>River lamprey, <i>Lampetra fluviatilis</i>; and</li> <li>Grey seal, <i>Halichoerus grypus</i>.</li> </ul>	<ul style="list-style-type: none"> <li>Increases in suspended sediment concentrations and deposition of disturbed sediments to the seabed due to planting activities and seabed sampling;</li> <li>Temporary habitat disturbance from planting activities and seabed sampling; and</li> <li>Accidental pollution.</li> </ul>	<ul style="list-style-type: none"> <li>Accidental pollution.</li> </ul>	N/A	C	Potential for LSE
Greater Wash SPA	Offshore and Intertidal Ornithology	<ul style="list-style-type: none"> <li>A001 <i>Gavia stellata</i>;</li> <li>A177 <i>Larus minutus</i>;</li> <li>A065 <i>Melanitta nigra</i>;</li> </ul>	<ul style="list-style-type: none"> <li>The impact of planting activities such as increased vessel activity or planting in intertidal area on foot may result in</li> </ul>	<ul style="list-style-type: none"> <li>The impact of monitoring activities such as increased vessel activity or monitoring of the intertidal area on foot may result in disturbance</li> </ul>	N/A	C	Potential for LSE

Designated Site	Receptor Types	Features Identified for Screening	Relevant effect(s)			Consideration of Potential LSE	Conclusion of Potential LSE
			Installation/Construction	Implementation/Operation	Decommissioning		
		<ul style="list-style-type: none"> <li>• A195 <i>Sterna albifrons</i>;</li> <li>• A193 <i>Sterna hirundo</i>; and</li> <li>• A191 <i>Sterna sandvicensis</i>.</li> </ul>	direct disturbance or displacement from important foraging and habitat areas of birds; and <ul style="list-style-type: none"> <li>• Accidental pollution.</li> </ul>	or displacement from important foraging and habitat areas of birds; and <ul style="list-style-type: none"> <li>• Accidental pollution.</li> </ul>			
Humber Estuary SPA	Offshore and Intertidal Ornithology	<ul style="list-style-type: none"> <li>• A052 <i>Anas crecca</i>;</li> <li>• A050 <i>Anas penelope</i>;</li> <li>• A053 <i>Anas platyrhynchos</i>;</li> <li>• A169 <i>Arenaria interpres</i>;</li> <li>• A059 <i>Aythya ferina</i>;</li> <li>• A062 <i>Aythya marila</i>;</li> <li>• A021 <i>Botaurus stellaris</i>;</li> <li>• A675 <i>Branta bernicla bernicla</i>;</li> <li>• A067 <i>Bucephala clangula</i>;</li> <li>• A144 <i>Calidris alba</i>;</li> <li>• A672 <i>Calidris alpina alpina</i>;</li> <li>• A143 <i>Calidris canutus</i>;</li> <li>• A137 <i>Charadrius hiaticula</i>;</li> <li>• A137 <i>Charadrius hiaticula</i>;</li> <li>• A081 <i>Circus aeruginosus</i>;</li> <li>• A082 <i>Circus cyaneus</i>;</li> <li>• A130 <i>Haematopus ostralegus</i>;</li> <li>• A157 <i>Limosa lapponica</i>;</li> <li>• A616 <i>Limosa limosa islandica</i>;</li> <li>• A160 <i>Numenius arquata</i>;</li> <li>• A158 <i>Numenius phaeopus</i>;</li> <li>• A151 <i>Philomachus pugnax</i>;</li> <li>• A140 <i>Pluvialis apricaria</i>;</li> <li>• A141 <i>Pluvialis squatarola</i>;</li> <li>• A132 <i>Recurvirostra avosetta</i>;</li> <li>• A195 <i>Sterna albifrons</i>;</li> <li>• A048 <i>Tadorna tadorna</i>;</li> <li>• A164 <i>Tringa nebularia</i>;</li> <li>• A162 <i>Tringa totanus</i>;</li> <li>• A142 <i>Vanellus vanellus</i>; and</li> <li>• <i>Waterfowl assemblage</i>.</li> </ul>	<ul style="list-style-type: none"> <li>• The impact of planting activities such as increased vessel activity or planting in intertidal area on foot may result in direct disturbance or displacement from important foraging and habitat areas of birds; and</li> <li>• Accidental pollution.</li> </ul>	<ul style="list-style-type: none"> <li>• The impact of monitoring activities such as increased vessel activity or monitoring of the intertidal area on foot may result in disturbance or displacement from important foraging and habitat areas of birds; and</li> <li>• Accidental pollution.</li> </ul>	N/A	C	<b>Potential for LSE</b>

## 8.2 Assessment of Adverse Effect Alone – Information to Inform Appropriate Assessment (Resilience Measure – Fish Habitat Enhancement (Seagrass))

- 8.2.1.1 Where potential for LSE on a European site(s) has been identified, there is a requirement to consider whether that potential effect(s) will adversely affect the integrity of the site in view of its conservation objectives ([Figure 9](#)). The potential for LSE for the resilience measure fish habitat enhancement (seagrass) Compensation Measure is presented in [Table 16](#). Potential for LSE applies where a feature is known to be sensitive to the effect and a potential pathway cannot be discounted.
- 8.2.1.2 The approach taken to HRA for the Compensation Measures is summarised in [Figure 10](#). Where the screening conclusion is that there is a potential LSE, the primary measure applied to avoid an AEol is mitigation. For Hornsea Four, these measures are identified in [Volume A45.2: Commitments Register \(REP6-008\)](#), with the commitments relevant to offshore compensation measures provided in [Table 7](#) for ease of reference. It should be noted, however, that ultimately, the Compensation Measures will not be consented through the Hornsea Four DCO application process and will be subject to (where necessary) standalone EIA and HRA processes as part of their own consenting process (for example a Marine Licence application and/or Planning Application). As part of that consenting process, further assessment work will be undertaken, based on refined design and methodology details.
- 8.2.1.3 The information to inform the AA for the resilience measure fish habitat enhancement (seagrass) Compensation Measure is presented in [Table 17](#); the table details all designated sites, features and effects for which a potential for LSE has been identified, proposes appropriate Commitments (mitigation) that could be applied to avoid or reduce the impacts, and provides conclusions on whether there is potential for AEol after the application of these Commitments for the project alone. Consideration to AEol in-combination is made in [Section 9](#).



**Table 17: Assessment of AEol Alone for Fish Habitat Enhancement (Seagrass).**

Site	Feature	Project Phase			Effect	Relevant Commitment	Potential for AEol
		C	O	D			
Humber Estuary Ramsar	<ul style="list-style-type: none"> <li>Ramsar criterion 1: The site is a representative example of a near-natural estuary with the following component habitats: dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, and coastal brackish/saline lagoons.</li> </ul>	✓	✗	✗	Temporary habitat disturbance from planting activities and seabed sampling.	CoC-OFF-8	As a result of the implementation of CoC-OFF-8 and the impact being highly limited in extent and duration, there is <b>no potential for AEol</b> .
		✓	✗	✗	Increases in suspended sediment concentrations and deposition of disturbed sediments to the seabed due to planting activities and seabed sampling.	CoC-OFF-8	The works will result in the disturbance of small amounts of sediment, with the sediment being released into the water column and subsequently dispersed with the tide. Given the small amounts, the natural background levels of suspended sediment in the lower parts of the water column in the UK waters, the short term and intermittent releases of sediment, and the implementation of CoC-OFF-8, it can be concluded that there is <b>no potential for AEol</b> .
		✗	✓	✗	Change of habitat type following introduction or reinstatement of seagrass.	CoC-OFF-8	As a result of the implementation of CoC-OFF-8 there is <b>no potential for AEol</b> .
		✓	✓	✗	Accidental pollution.	CoC-OFF-7	As a result of the implementation of CoC-OFF-7, there is <b>no potential for AEol</b> .
	<ul style="list-style-type: none"> <li>Ramsar criterion 3: The Humber Estuary Ramsar site supports a breeding colony of grey seals <i>Halichoerus grypus</i> at Donna Nook. It is the second largest grey seal colony in England and the furthest south regular breeding site on the east coast</li> </ul>	✓	✗	✗	Increased vessel traffic during planting activities may result in an increase in disturbance to or collision risk with marine mammals.	CoC-OFF-4	As a result of the implementation of CoC-OFF-4, there is <b>no potential for AEol</b> .
		✓	✓	✓	Accidental pollution.	CoC-OFF-7	As a result of the implementation of CoC-OFF-7, there is <b>no potential for AEol</b> .
		✗	✓	✗	Increased vessel traffic during monitoring activities may result in an increase in disturbance to or collision risk with marine mammals.	CoC-OFF-4	As a result of the implementation of CoC-OFF-4, there is <b>no potential for AEol</b> .
	<ul style="list-style-type: none"> <li>Ramsar criterion 8: The Humber Estuary acts as an important migration route for both river lamprey (<i>Lampetra fluviatilis</i>) and sea lamprey (<i>Petromyzon marinus</i>) between coastal waters and their spawning areas.</li> </ul>	✓	✗	✗	Increases in suspended sediment concentrations and deposition of disturbed sediments to the seabed due to planting activities and seabed sampling.	CoC-OFF-8	The works will result in the disturbance of small amounts of sediment, with the sediment being released into the water column and subsequently dispersed with the tide. Given the small amounts, the natural background levels of suspended sediment in the lower parts of the water column in the UK waters, the short term and intermittent releases of sediment, and the implementation of CoC-OFF-8, it can be concluded that there is <b>no potential for AEol</b> .
		✓	✗	✗	Temporary habitat disturbance from planting activities and seabed sampling.	CoC-OFF-8	As a result of the implementation of CoC-OFF-8 and the impact being highly limited in extent and duration, there is <b>no potential for AEol</b> .
		✓	✓	✗	Accidental pollution.	CoC-OFF-7	No potential for AEol
	<ul style="list-style-type: none"> <li>Ramsar criterion 5: Assemblages of international importance: 153,934 waterfowl, non-breeding season (5 year peak mean 1996/97-2000/2001); and</li> <li>Ramsar criterion 6: species/populations occurring at levels of international importance: Common shelduck, <i>Tadorna tadorna</i>, Eurasian golden plover, <i>Pluvialis apricaria</i>, <i>altifrons</i>, Red knot, <i>Calidris canutus islandica</i>, Dunlin, <i>Calidris alpina alpina</i>, Black-tailed godwit, <i>Limosa limosa islandica</i>, Bar-tailed godwit, <i>Limosa lapponica lapponica</i>, and Common redshank, <i>Tringa totanus</i>.</li> </ul>	✓	✗	✗	The impact of planting activities such as increased vessel activity may result in direct disturbance or displacement from important foraging and habitat areas of birds.	CoC-OFF-4	As a result of the implementation of CoC-OFF-4, there is <b>no potential for AEol</b> .
		✓	✓	✗	Accidental pollution.	CoC-OFF-7	As a result of the implementation of CoC-OFF-7, there is <b>no potential for AEol</b> .
✗		✓	✗	The impact of monitoring activities such as increased vessel activity may result in disturbance or displacement from important foraging and habitat areas of birds.	CoC-OFF-4	As a result of the implementation of CoC-OFF-4, there is <b>no potential for AEol</b> .	
Humber Estuary SAC	<ul style="list-style-type: none"> <li>Estuaries;</li> <li>Mudflats and sandflats not covered by seawater at low tide;</li> <li>Sandbanks which are slightly covered by sea water all the time;</li> <li>Coastal lagoons (*Priority feature);</li> <li>Salicornia and other annuals colonizing mud and sand and;</li> <li>Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>).</li> </ul>	✓	✗	✗	Temporary habitat disturbance from planting activities and seabed sampling.	CoC-OFF-8	As a result of the implementation of CoC-OFF-8 and the impact being highly limited in extent and duration, there is <b>no potential for AEol</b> .
		✓	✗	✗	Increases in suspended sediment concentrations and deposition of disturbed sediments to the seabed due to planting activities and seabed sampling.	CoC-OFF-8	The works will result in the disturbance of small amounts of sediment, with the sediment being released into the water column and subsequently dispersed with the tide. Given the small amounts, the natural background levels of suspended sediment in the lower parts of the water column in the UK waters, the short term and intermittent releases of sediment, and the implementation of CoC-OFF-8, it can be concluded that there is <b>no potential for AEol</b> .
		✗	✓	✗	Change of habitat type following introduction or reinstatement of seagrass.	CoC-OFF-8	As a result of the implementation of CoC-OFF-8 there is <b>no potential for AEol</b> .
		✓	✓	✗	Accidental pollution.	CoC-OFF-7	As a result of the implementation of CoC-OFF-7, there is <b>no potential for AEol</b> .

Site	Feature	Project Phase			Effect	Relevant Commitment	Potential for AEol
		C	O	D			
	<ul style="list-style-type: none"> <li>• <i>Sea lamprey, Petromyzon marinus</i></li> <li>• <i>River lamprey, Lampetra fluviatilis</i>; and</li> <li>• <i>Grey seal, Halichoerus grypus</i>.</li> </ul>	✓	✗	✗	Increases in suspended sediment concentrations and deposition of disturbed sediments to the seabed due to planting activities and seabed sampling.	CoC-OFF-8	The works will result in the disturbance of small amounts of sediment, with the sediment being released into the water column and subsequently dispersed with the tide. Given the small amounts, the natural background levels of suspended sediment in the lower parts of the water column in the UK waters, the short term and intermittent releases of sediment, and the implementation of CoC-OFF-8, it can be concluded that there is <b>no potential for AEol</b>
		✓	✗	✗	Temporary habitat disturbance from planting activities and seabed sampling.	CoC-OFF-8	As a result of the implementation of CoC-OFF-8 and the impact being highly limited in extent and duration, there is <b>no potential for AEol</b> .
		✓	✓	✗	Accidental pollution.	CoC-OFF-7	As a result of the implementation of CoC-OFF-7, there is <b>no potential for AEol</b> .
Greater Wash SPA	<ul style="list-style-type: none"> <li>• A001 <i>Gavia stellata</i>;</li> <li>• A177 <i>Larus minutus</i>;</li> <li>• A065 <i>Melanitta nigra</i>;</li> <li>• A195 <i>Sterna albifrons</i>;</li> <li>• A193 <i>Sterna hirundo</i>; and</li> <li>• A191 <i>Sterna sandvicensis</i>.</li> </ul>	✓	✗	✗	The impact of planting activities such as increased vessel activity may result in direct disturbance or displacement from important foraging and habitat areas of birds.	CoC-OFF-4	As a result of the implementation of CoC-OFF-4, there is <b>no potential for AEol</b> .
		✓	✓	✗	Accidental pollution.	CoC-OFF-7	As a result of the implementation of CoC-OFF-7, there is <b>no potential for AEol</b> .
		✗	✓	✗	The impact of monitoring activities such as increased vessel activity may result in disturbance or displacement from important foraging and habitat areas of birds.	CoC-OFF-4	As a result of the implementation of CoC-OFF-4, there is <b>no potential for AEol</b> .
Humber Estuary SPA	<ul style="list-style-type: none"> <li>• A052 <i>Anas crecca</i>;</li> <li>• A050 <i>Anas penelope</i>;</li> <li>• A053 <i>Anas platyrhynchos</i>;</li> <li>• A169 <i>Arenaria interpres</i>;</li> <li>• A059 <i>Aythya ferina</i>;</li> <li>• A062 <i>Aythya marila</i>;</li> <li>• A021 <i>Botaurus stellaris</i>;</li> <li>• A675 <i>Branta bernicla bernicla</i>;</li> <li>• A067 <i>Bucephala clangula</i>;</li> <li>• A144 <i>Calidris alba</i>;</li> <li>• A672 <i>Calidris alpina alpina</i>;</li> <li>• A143 <i>Calidris canutus</i>;</li> <li>• A137 <i>Charadrius hiaticula</i>;</li> <li>• A081 <i>Circus aeruginosus</i>;</li> <li>• A082 <i>Circus cyaneus</i>;</li> <li>• A130 <i>Haematopus ostralegus</i>;</li> <li>• A157 <i>Limosa lapponica</i>;</li> <li>• A616 <i>Limosa limosa islandica</i>;</li> <li>• A160 <i>Numenius arquata</i>;</li> <li>• A158 <i>Numenius phaeopus</i>;</li> <li>• A151 <i>Philomachus pugnax</i>;</li> <li>• A140 <i>Pluvialis apricaria</i>;</li> <li>• A141 <i>Pluvialis squatarola</i>;</li> <li>• A132 <i>Recurvirostra avosetta</i>;</li> <li>• A195 <i>Sterna albifrons</i>;</li> <li>• A048 <i>Tadorna tadorna</i>;</li> <li>• A164 <i>Tringa nebularia</i>;</li> <li>• A162 <i>Tringa totanus</i>;</li> <li>• A142 <i>Vanellus vanellus</i>; and</li> <li>• <i>Waterfowl assemblage</i>.</li> </ul>	✓	✗	✗	The impact of planting activities such as increased vessel activity may result in direct disturbance or displacement from important foraging and habitat areas of birds.	CoC-OFF-4	As a result of the implementation of CoC-OFF-4, there is <b>no potential for AEol</b> .
		✓	✓	✗	Accidental pollution.	CoC-OFF-7	As a result of the implementation of CoC-OFF-7, there is <b>no potential for AEol</b> .
		✗	✓	✗	The impact of monitoring activities such as increased vessel activity may result in disturbance or displacement from important foraging and habitat areas of birds.	CoC-OFF-4	As a result of the implementation of CoC-OFF-4, there is <b>no potential for AEol</b> .

## 9 Conclusions

9.1.1.1 The Hornsea Four Compensation Measures HRA has provided the information necessary for the competent authority to undertake HRA Stage 1 (Screening) and Stage 2 (AA) with respect to the following Compensation Measures:

- A repurposed offshore nesting platform;
- A new offshore nesting platform;
- A new onshore nesting platform;
- Bycatch Reduction technologies;
- Predator eradication; and
- Resilience Measure – Fish Habitat Enhancement (Seagrass).

9.1.1.2 Each measure is described in terms of the AoS (where the measures could be located), how the measure would be implemented, managed and (where relevant) decommissioned. For each Compensation Measure, the potential effects that may result are identified for each stage of the Measure, with reference to the relevant receptor groups: benthic ecology, migratory fish, marine mammals, offshore and intertidal ornithology and onshore ecology.

9.1.1.3 For each compensation Measure (and for some with respect to more than one AoS), GIS has been applied to identify the relevant sites and features to consider for Stage 1 Screening. Potential for LSE is then established, per Compensation Measure and for each site and feature. Where no potential for LSE is identified, then the site/feature/effect is not carried forward to Stage 2 AA. Where potential for LSE is identified alone, it is assumed that potential for LSE applies in-combination.

9.1.1.4 For the sites/features/effects screened in for potential LSE, and for each Compensation Measure in turn, determination of the potential for AEol is made. For all Compensation Measures, a conclusion of no AEol has been drawn and therefore no requirement to progress beyond Stage 2 has been identified. In the majority of cases, project level mitigation commitments ([Table 7](#)) have been applied to ensure no AEol would arise alone. Where the potential effect is considered to be trivial and inconsequential, then minor effects are concluded as not adverse, with such effects considered to be within natural change.

9.1.1.5 With respect to the potential for a small change from the project alone to contribute to an in-combination effect, it is not possible at this stage to undertake an in-combination assessment given the broadscale nature of the AoS. However, as these areas become more refined, such an assessment will be possible and would be considered as part of the associated licensing process if required (as noted under [Section 2.4](#)).

## 10 References

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## Appendix A: Metadata for the datasets used in the screening exercise

Name	Description	Data Type	Originator	Dates: Created (Downloaded by Authors)	Notes
HOW04_European_SACs_Natura2000_ETRS89	European SACs/SCIs	ArcGIS Feature Class	European Commission - Natura 2000	end 2019 (June 2020)	Used to show Doggersbank and Klaverbank SACs (for site A1)
HOW04_UK_SACs_with_Marine_Components_ETRS89	UK Marine SACs	ArcGIS Feature Class	JNCC	Dec 2018 (14/01/2019)	
HOW04_Special_Areas_of_Conservation_England_BNG	England Onshore SACs	ArcGIS Feature Class	Natural England	Jan 2019 (14/01/2019)	
HOW04_UK_SPAs_with_Marine_Components_ETRS89	UK Marine SPAs	ArcGIS Feature Class	JNCC	Dec 2018 (14/01/2019)	
HOW04_Special_Protected_Areas_England_BNG	England Onshore SPAs	ArcGIS Feature Class	Natural England	2019 (April 2019)	
HOW04_UK_Ramsar_ETRS89	England Ramsar Sites	ArcGIS Feature Class	Natural England	Jan 2019 (14/01/2019)	Guernsey sites 'Gouliot Caves and Headland', 'Herm, Jethou and The Humps', 'Lihou Island and l'Erée Headland' and 'West Coast and Burhou Islands' digitised from online plans
HOW04_Offshore_WFs_20210614_ETRS89	Offshore Wind Farms	ArcGIS Feature Class	TCE, CES, EMODnet, 4Coffshore	Compiled from sources June 2021	
HOW04_Oil_and_Gas_Surface_Features_ETRS89	UK Oil & Gas Platforms	ArcGIS Feature Class	Oil & Gas Authority UK	April 2019 (April 2019)	



## Appendix B: Information on Identified Designated Sites.

Site Name	Designated Features	Link to Site Citation	Link to Conservation Objectives
Gouliot Caves and Headland Ramsar	Assemblage of marine life found on the walls of the caves. Wide range of inter-tidal and normally sub-littoral invertebrates. Particularly noteworthy are the sponges (Porifera), and sea anemones and other hydroids (Cnidaria).	[REDACTED]	N/A
Herm, Jethou and The Humps Ramsar	Dwarf eelgrass ( <i>Zostera noltii</i> ) beds, Maerl beds, shallow reef systems, sunken shipwreck reefs and Golden Kelp ( <i>Laminaria ochroleuca</i> ) provide important fish spawning habitats for fish such as Sea Bass and Black Sea Bream, with significant tidal races. The bivalve reefs contained within the site are particularly significant. The Site is contiguous with benthic and pelagic habitats supporting flatfish and shellfish among others.	[REDACTED]	N/A
Humber Estuary Ramsar	Dune systems and humid dune slacks, estuarine waters, intertidal mud and sand flats, saltmarshes, coastal brackish/saline lagoons, river lamprey ( <i>Lampetra fluviatilis</i> ), sea lamprey ( <i>Petromyzon marinus</i> ), grey seals ( <i>Halichoerus grypus</i> ), waterfowl assemblage, Common shelduck ( <i>Tadorna tadorna</i> ), Eurasian golden plover ( <i>Pluvialis apricaria</i> ), Red knot ( <i>Calidris canutus</i> ), islandica subspecies, Dunlin ( <i>Calidris alpina</i> ), Black-tailed godwit ( <i>Limosa limosa</i> ), Bar-tailed godwit ( <i>Limosa lapponica</i> ) and Common redshank ( <i>Tringa totanus</i> ).	<a href="https://jncc.gov.uk/jncc-assets/RIS/UK11031.pdf">https://jncc.gov.uk/jncc-assets/RIS/UK11031.pdf</a>	N/A
Lihou Island and l'Erée Headland Ramsar	Rocky, gravelly and sandy shoreline, the sublittoral zone, coastal grassland, saltmarsh, reedbed and saline lagoon. The site includes also vegetated shingle banks, seagrass <i>Zostera</i> beds and wet grassland. The area is particularly suitable for the ormer <i>Haliotis tuberculata</i> . Bird assemblage: great black-backed gull, <i>Larus marinus</i> ; Common shelduck, <i>Tadorna tadorna</i> ; Eurasian oystercatcher, <i>Haematopus ostralegus</i> ; ringed plover, <i>Charadrius hiaticula</i> ; stonechat <i>Saxicola torquata</i> , reed warbler <i>Acrocephalus scirpaceus</i> ; common moorhen, <i>Gallinula chloropus</i> ; common coot, <i>Fulica atra</i> ; feral geese; quatic warbler, <i>Acrocephalus paludicola</i> ; Northern shoveler, <i>Anas clypeata</i> , common teal, <i>Anas crecca</i> ; Eurasian wigeon, <i>Anas penelope</i> ; and common snipe <i>Gallinago gallinago</i> .	<a href="https://jncc.gov.uk/jncc-assets/RIS/UK22001.pdf">https://jncc.gov.uk/jncc-assets/RIS/UK22001.pdf</a>	N/A

# Hornsea 4



Site Name	Designated Features	Link to Site Citation	Link to Conservation Objectives
Teesmouth and Cleaveland Coast Ramsar	Bird assemblage, common redshank, <i>Tringa totanus totanus</i> , and red knot, <i>Calidris canutus islandica</i> .	<a href="https://jncc.gov.uk/jn-cc-assets/RIS/UK11068.pdf">https://jncc.gov.uk/jn-cc-assets/RIS/UK11068.pdf</a>	N/A
West Coast and Burhou Islands	Seagrass beds, dune slack wet-grasslands, vegetated shingle banks, sand dunes, dune and coastal grassland, soft cliffs, sandy, gravelly and rocky shores. Nesting bird assemblage including European storm-petrel, <i>Hydrobates pelagicus</i> ; Atlantic puffin, <i>Fratercula arctica</i> ; lesser black-backed gull, <i>Larus fuscus</i> ; great black-backed gull <i>Larus marinus</i> and northern gannet, <i>Morus bassanus</i> . High diversity of fish and shellfish, with ormers, <i>Haliotis tuberculata</i> , common.	<a href="https://jncc.gov.uk/jn-cc-assets/RIS/UK22002.pdf">https://jncc.gov.uk/jn-cc-assets/RIS/UK22002.pdf</a>	N/A
Beast Cliff – Whitby (Robin Hood’s Bay) SAC	Vegetated sea cliffs of the Atlantic and Baltic Coasts	[REDACTED]	[REDACTED]
Castle Eden Dene SAC	Castle Eden Dene in north-east England represents the most extensive northerly native occurrence of yew <i>Taxus baccata</i> woods in the UK. Extensive yew groves are found in association with ash-elm <i>Fraxinus-Ulmus</i> woodland and it is the only site selected for yew woodland on magnesian limestone in north-east England.	<a href="https://sac.jncc.gov.uk/site/UK0012768">https://sac.jncc.gov.uk/site/UK0012768</a>	[REDACTED]
Durham Coast SAC	The Durham Coast is the only example of vegetated sea cliffs on magnesian limestone exposures in the UK. These cliffs extend along the North Sea coast for over 20 km from South Shields southwards to Blackhall Rocks. Their vegetation is unique in the British Isles and consists of a complex mosaic of paramaritime, mesotrophic and calcicolous grasslands, tall-herb fen, seepage flushes and wind-pruned scrub. Within these habitats rare species of contrasting phytogeographic distributions often grow together forming unusual and species-rich communities of high scientific interest. The communities present on the sea cliffs are largely maintained by natural processes including exposure to sea spray, erosion and slippage of the soft magnesian limestone bedrock and overlying glacial drifts, as well as localised flushing by calcareous water.	<a href="https://sac.jncc.gov.uk/site/UK0030140">https://sac.jncc.gov.uk/site/UK0030140</a>	[REDACTED]

# Hornsea 4



Site Name	Designated Features	Link to Site Citation	Link to Conservation Objectives
Hainsborough, Hammond and Winterton SAC	Sandbanks which are slightly covered by sea water all the time, and Reefs.	N/A	[Redacted]
Humber Estuary SAC	Estuaries, Mudflats and sandflats not covered by seawater at low tide, Sandbanks which are slightly covered by sea water all the time, Salicornia and other annuals colonizing mud and sand, Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> ), Embryonic shifting dunes, Coastal lagoons (*Priority feature), "Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ("white dunes")", "Fixed coastal dunes with herbaceous vegetation ("grey dunes")" (*Priority feature), Dunes with <i>Hippoph rhamnoides</i> , Grey seal, <i>Halichoerus grypus</i> Sea lamprey, <i>Petromyzon marinus</i> , River lamprey, <i>Lampetra fluviatilis</i>	[Redacted]	[Redacted]
North Norfolk Sandbanks and Saturn Reef SAC	Sandbanks which are slightly covered by sea water all the time, and reefs.	N/A	<a href="https://jncc.gov.uk/our-work/north-norfolk-sandbanks-and-saturn-reef-mpa/#conservation-advice">https://jncc.gov.uk/our-work/north-norfolk-sandbanks-and-saturn-reef-mpa/#conservation-advice</a>
Flamborough & Filey Coast SPA	<i>Alca torda</i> , <i>Morus bassanus</i> , <i>Rissa tridactyla</i> , <i>Uria aalge</i> , and seabird assemblage.	[Redacted]	[Redacted]
Humber Estuary SPA	<i>Anas crecca</i> , <i>Anas Penelope</i> , <i>Anas platyrhynchos</i> , <i>Arenaria interpres</i> , <i>Aythya farina</i> , <i>Aythya marila</i> <i>Botaurus stellari</i> <i>Branta bernicla bernicla</i> , <i>Bucephala clangula</i> , <i>Calidris alba</i> , <i>Calidris alpina alpina</i> , <i>Calidris canutu</i> , <i>Charadrius hiaticula</i> , <i>Charadrius hiaticula</i> , <i>Circus aeruginosus</i> , <i>Circus cyaneus</i> , <i>Haematopus ostralegus</i> , <i>Limosa lapponica</i> , <i>Limosa limosa islandica</i> , <i>Numenius arquata</i> , <i>Numenius phaeopus</i> , <i>Philomachus pugnax</i> , <i>Pluvialis apricaria</i> , <i>Pluvialis squatarola</i> , <i>Recurvirostra avosetta</i> , <i>Sterna</i>	[Redacted]	[Redacted]

# Hornsea 4



Site Name	Designated Features	Link to Site Citation	Link to Conservation Objectives
	<i>albifrons</i> , <i>Tadorna tadorna</i> , <i>Tringa nebularia</i> , <i>Tringa totanus</i> , <i>Vanellus vanellus</i> , and waterfowl assemblage		
Northumbria Coast SPA	<i>Arearia interpres</i> , <i>Calidris maritima</i> , <i>Sterna albifrons</i> , <i>Sterna paradiaea</i>	<a href="https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9006131.pdf">https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9006131.pdf</a>	[REDACTED]
Teesmouth and Cleaveland Coast SPA	<i>Calidris canutus</i> , <i>Philomachus pugnax</i> , <i>Recurvirostra avosetta</i> , <i>Sterna albifrons</i> , <i>Sterna hirundo</i> , <i>Sterna sandvicensis</i> , <i>Tringa totanus</i> ; and waterbird assemblage	[REDACTED]	[REDACTED]