



# Hornsea Project Four: Environmental Statement (ES)

## Bycatch Mitigation Project Description

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Doc. No: A4.6.1  
Version: A

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## Glossary

Term	Definition
Commitment	Hornsea Four, throughout the pre-Application consultation process, has produced a Commitments Register which forms a quick reference guide to commitments the project has made. Commitment is 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. Secondary commitments are incorporated to reduce LSE to environmentally acceptable levels following initial assessment i.e. so that residual effects are acceptable.
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: [offshore and onshore nesting; predator eradication; bycatch and fish habitat enhancement measures]. Each a Compensation Measure and together 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 and this Compensation 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).
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA Regulations, including the publication of an Environmental Statement (ES).
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, 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).
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).

## Acronyms

Term	Definition
DCO	Development Consent Order
EIA	Environmental Impact Assessment
ES	Environmental Statement
HRA	Habitats Regulations Assessment
MDS	Maximum Design Scenario
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
PEIR	Preliminary Environmental Information Report
PINS	The Planning Inspectorate
PSA	Particle Size Analysis
SAC	Special Area of Conservation
SPA	Special Protection Area
SSS	Side-Scan Sonar
TCE	The Crown Estate
UKHO	UK Hydrographic Office

## Units

Unit	Definition
dB	Decibel (sound pressure)
Hz	Hertz (frequency)

## 1 Introduction

### 1.1 Project Background

- 1.1.1.1 Orsted Hornsea Project Four Limited (the 'Applicant') is proposing to develop Hornsea Project Four Offshore Wind Farm ('Hornsea Four').
- 1.1.1.2 The purpose of this Environmental Impact Assessment (EIA) Project Description Annex is to provide a description of the proposed Compensation Measures the Applicant may be required to deliver to compensate for potential impacts upon certain seabird species at the Flamborough and Filey Coast Special Protection Area (FFC SPA), located on the East Coast of England. The Compensation Measures are proposed "without prejudice" to the Applicant's conclusion of No Adverse Effect on Integrity (AEoI) upon the seabird species (kittiwake, gannet, guillemot and razorbill) in the Report to Inform the Appropriate Assessment (RIAA).
- 1.1.1.3 The Hornsea Four offshore wind farm 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 (at Fraisthorpe), and connection to the electricity transmission network at National Grid Creyke Beck. Detailed information on the project design can be found in **Volume 1: Project Description**, with detailed information on the site selection process and consideration of alternatives described in **Volume 1: Site Selection and Consideration of Alternatives** which are provided on the Hornsea Four website in the Documents Library at:
- 1.1.1.4 <https://hornseaprojects.co.uk/hornsea-project-four/documents-library/formal-consultation>
- 1.1.1.5 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.
- 1.1.1.6 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..
- 1.1.1.7 The Applicant is submitting an application for a DCO to the Planning Inspectorate (PINS), supported by a range of plans and documents including an ES which sets out the results of

the EIA on the proposed offshore wind farm and its associated infrastructure, and an Annex to the EIA which assesses the environmental impact associated with the implementation of the proposed Compensation Measures, which are set out in this Compensation Project Description.

- 1.1.1.8 The Applicant is also submitting a RIAA which sets out the information necessary for the competent authority to undertake a Habitats Regulations Assessment (HRA) to determine if there is any Adverse Effect on Integrity (AEoI) on the national site network as a result of the development of the Hornsea Four offshore wind farm and its associated infrastructure. A separate HRA Screening exercise has been complete for the implementation of the Compensation Measures as presented in [Volume B2, Annex 2.2](#).

## 1.2 The Derogation Provisions of the Habitats Regulations

- 1.2.1.1 The Habitat Regulations transposed into UK law the requirements of the Habitats Directive. Although the UK left the European Union (EU) on 31 January 2020, the Habitats Directive provides the legislative backdrop to the Habitats Regulations. The Habitats Directive seeks to conserve particular natural habitats and wild species across the EU by, amongst other measures, establishing a network of sites ("European sites") which together form the "National Site Network." The aim is to ensure the long-term survival of viable populations of Europe's most valuable and threatened species and habitats, to maintain and promote biodiversity.
- 1.2.1.2 The Habitats Directive acknowledges that the imperative of some plans and projects can outweigh the possible harm to a European site if that harm can be adequately compensated. The Directive provides a derogation under Article 6(4) that allows projects that may have an AEoI to be consented. In such a scenario, a derogation could only be provided under Article 6(4) if three tests are met in a sequential order:
- i. There are no feasible alternative solutions to the project;
  - ii. There are "imperative reasons of overriding public interest" (IROPI) for the project to proceed; and
  - iii. Compensatory measures are secured that ensure that the overall coherence of the network of European sites is maintained.
- 1.2.1.3 The derogation tests thereby underpin a three-step process, which are hereafter referred to as the "HRA Derogation Provisions".

- 1.2.1.4 The Habitats Regulations do not define what is meant by or may comprise "compensatory measures" or when they must be delivered. There is also no definition of the "overall coherence of the National Site Network". In principle, both are broad concepts. The limited case law on compensation confirms only:
- Compensation is distinct from mitigation (i.e., measures which prevent, avoid or reduce the harm to the integrity of the affected European site)<sup>1</sup>.
  - Compensation can be delivered inside or outside a European site<sup>2</sup>.
- 1.2.1.5 As there is no binding EU or UK case law that fixes the precise parameters of or timing for delivery of compensation, there is a degree of flexibility and it will be a matter of judgement for the Secretary of State (SoS) to determine what is "necessary" by way of compensation, acting reasonably and proportionately.
- 1.2.1.6 The Applicant firmly maintains the position that in respect of the designated sites, that there would be no AEoI as a result of the project alone and in-combination with other plans and projects and an AEoI can be ruled out beyond reasonable scientific doubt. The offshore wind farm and associated infrastructure RIAA will be submitted with the DCO application and will set out in detail the assessment and conclusion of no AEoI.
- 1.2.1.7 Nonetheless, in light of the SoS's decision letters for recent windfarm applications (e.g. Hornsea Three and Norfolk Vanguard) that future projects should be mindful to ensure consideration of the need for derogation, including possible in-principle compensation measures are presented for consideration during the Examination of DCO application.

### 1.3 Development of Compensation Measures

- 1.3.1.1 The Applicant recognises the importance of engaging with the relevant stakeholders with respect to derogation and developing any potential compensation measures, as their knowledge is important. The Applicant has therefore sought to engage openly and transparently with the key stakeholders.
- 1.3.1.2 Consultation on the HRA Derogation Provisions has been ongoing in the latter stages of the pre-application stage during the course of a series of online workshops (employed during the COVID-19 pandemic to substitute meetings in-person). The Evidence Plan Process has been followed during the development of the derogation case and included a number of relevant authorities and stakeholders.
- 1.3.1.3 Throughout the Consultation period, the Applicant has sought the advice of key stakeholders and kept them updated on project developments. The online workshops were attended variably by Natural England, the Marine Management Organisation (MMO), the Department for Environment, Food and Rural Affairs (Defra), the Joint Nature Conservation Committee (JNCC), The Wildlife Trust (TWT), Royal Society for the Protection of Birds (RSPB), National Federation of Fishermen's Organisations (NFFO) the Planning Inspectorate (PINS),

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<sup>1</sup> Case C-521/12 Briels and Others, paragraphs 38 – 39.

<sup>2</sup> Case C-521/12 Briels and Others, paragraphs 38 – 39



East Riding of Yorkshire Council (ERYC) and The Crown Estate (TCE). Detail of consultation activity undertaken will be submitted with the DCO application in the Record of Consultation.

- 1.3.1.4 The Compensation Measures outlined herein could be implemented should the SoS conclude AEoI on any of the qualifying features of FFC SPA.

## **1.4 Compensation measures**

- 1.4.1.1** This EIA Project Description Annex describes the Compensation Measures that could be implemented to compensate for potential impacts upon ornithological features of FFC SPA. In summary, the potential Compensation Measures proposed, sub-options, locations, location ID and species being compensated are set out Table 1. It is anticipated that for guillemot and razorbill a package of measures could be required, rather than a single compensation measure. Compensation Measure Areas of Search are presented in the accompanying Location Plan (see [Figure 1](#)).

Table 1: Compensation Measures, sub-options, locations, location ID and species being compensated.

Compensation Measure	Option	Location	Location ID	Kittiwake	Gannet	Guillemot	Razorbill
Offshore nesting	New	southern North Sea	A1				
Offshore nesting	Repurposed	southern North Sea	A1				
Onshore nesting	New	Cayton Bay to Newbiggin by the Sea	B1				
		Suffolk Coast	B2				
Bycatch		Thames Estuary	C1				
		South coast of England: Broadstairs to Plymouth	C2				
Predator eradication		Isles of Scilly	D1				
		Rathlin Island, Moyle, Northern Ireland	D2				
		Torquay, Devon	D3				
		Guernsey and Alderney	D4				
Fish habitat enhancement	Seagrass	Rathlin Island, Moyle, Northern Ireland	E1				
	Seagrass	Isles of Scilly	E2				
	Seagrass	Celtic Sea, Wales	E3				
	Seagrass	Plymouth Sound to Helford River	E4				
	Seagrass	Solent	E5				
	Seagrass	Essex Estuaries	E6				

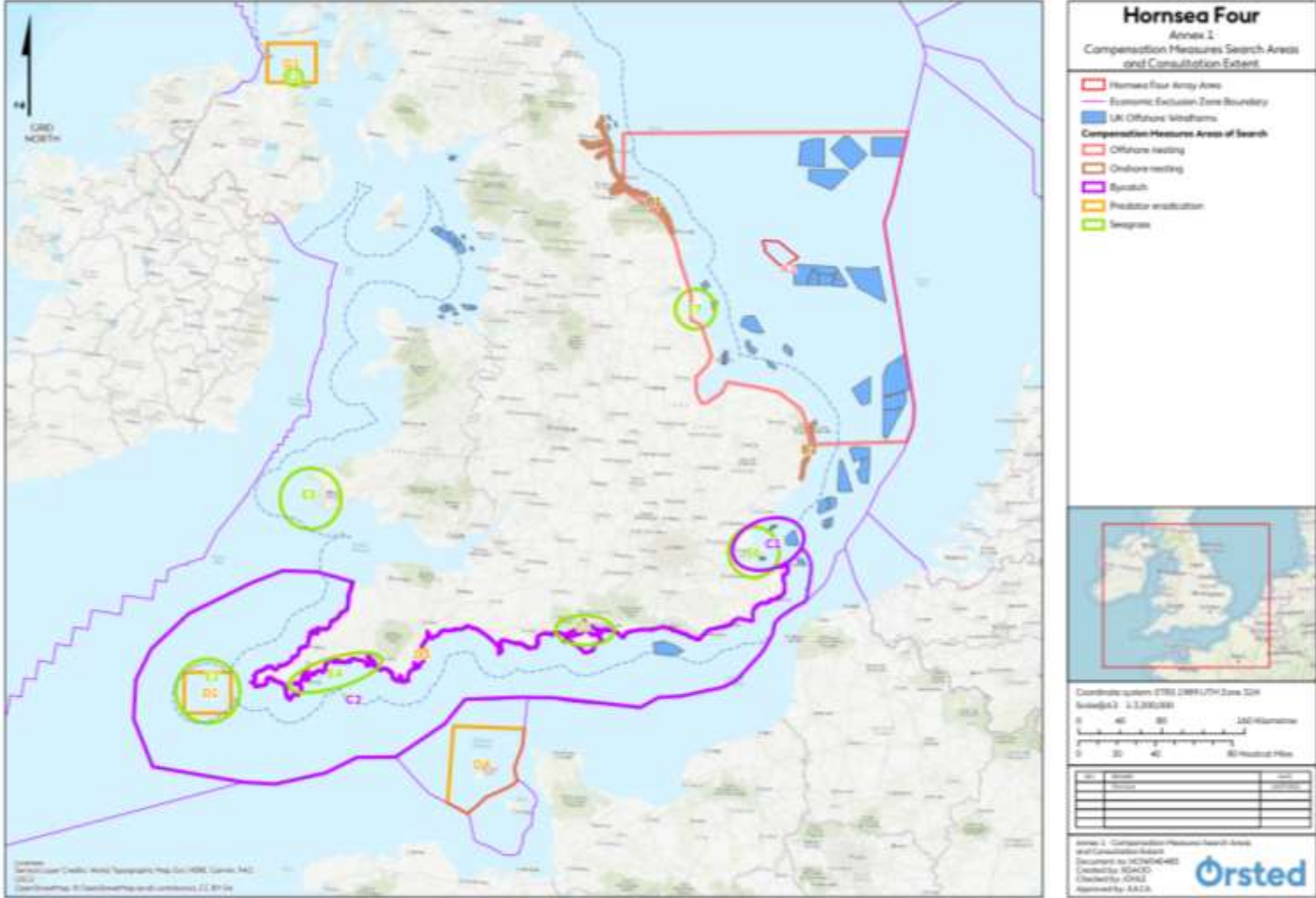


Figure 1: Compensation Search Areas

## 1.5 Programme

1.5.1.1 The high-level programme presented below is applicable to the implementation and delivery of all compensation measures.

- Anticipated Hornsea Four DCO Granted – Q1 2023
- Compensation implementation licencing – 2022/24
- Compensation Implementation – 2023/24
- Offshore Construction of Hornsea Four Offshore Wind Farm – 2027/28

## 1.6 Decommissioning

1.6.1.1 The requirement for, and the exact nature of decommissioning the offshore and onshore nesting structures, 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 structures 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.

1.6.1.2 It is currently anticipated that 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.

## 2 Bycatch mitigation

### 2.1 Introduction and Background

- 2.1.1.1 Seabirds are at risk from multiple anthropogenic threats, including as bycatch in UK fishing activities (Miles et al., 2020). Bycatch – 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). It has been estimated that hundreds of thousands of seabirds are killed each year in gillnets (400,000; Žydelis et al., 2013) and longline fisheries (320,000; Anderson et al., 2011). Despite this, monitoring of the issue is extremely low with onboard observer monitoring coverage relatively low compared to the scale of commercial fishing (Pott and Wiedenfeld, 2017).
- 2.1.1.2 To mitigate against the number of seabirds, specifically razorbills and guillemots that may be at risk of displacement from operation of the Hornsea Four Wind Farm, 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 within the wider site network.
- 2.1.1.3 The reduction of bird bycatch will be achieved through the use of additional deterrent equipment attached onto fishing gear. There are multiple types of mitigation technique that can be used to reduce the interactions of birds and fishing equipment. Each mitigation technique is more suited to specific fishing gear types and specific target bycatch species of birds. Defra and Cefas' joint Clean Catch initiative recommends bird bycatch mitigation measures including modifications to fishing gear, changes to fishing and processing techniques, and devices for attachment to fishing gear. The proposed mitigation methods being considered as a package of compensation measures are above water deterrents, net lights, and net panels.

### 2.2 Bycatch Mitigation Technology

#### 2.2.1 Above Water Deterrents

- 2.2.1.1 Above water deterrents ([Figure 2](#)) are usually fixed to buoys or markers attached to set fishing gear, which works 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. Deterrents usually comprise a buoy with some sort of attachment, such as spinning objects or small kites, to deter birds.



(Source: <https://www.acap.aq/latest-news/3453-portugal-tests-a-scary-bird-device-to-reduce-incident-catches-of-seabirds-in-fishing-gear>).

**Figure 2: An above water deterrent**

**2.2.1.2** Looming Eye Buoys (**Figure 3**) are one of the most highly developed form of above water deterrent. They comprise a floating buoy with a long stick (inset B and C) and a marker on the top that includes an eye-like pattern. 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 (inset A and B), whilst the bobbing and spinning of the buoy will result in a “looming” effect over the birds, thus preventing them from approaching the buoys. Current prototypes of these buoys are made of carbon and steel and include a spinning eye-panel at the top to keep birds away. They are not designed to make any noise and are attached to the fishing equipment already in place.

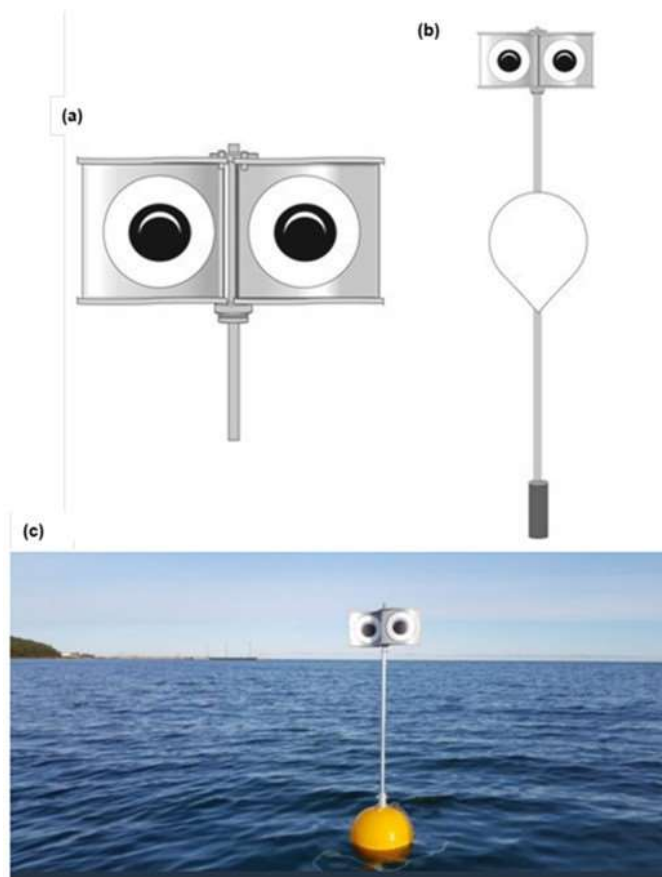


Figure 3: Looming Eye Buoy

## 2.2.2 Net Lighting (LEDs)

- 2.2.2.1 LED net lights (Figure 4) are small simple lights which can be attached to existing fishing gear to act as a deterrent to non-target species. The aim of the lights is to increase the visibility of the nets 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.



(Source: NetLight - Low cost net illumination for reduced bycatch (fishtekmarine.com))

**Figure 4: A commercially available net light**

## 2.2.3 Net Panels

2.2.3.1 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.

## 2.3 Fishery Types

2.3.1.1 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 mitigation types currently available are focussed on bycatch from gillnets. This Compensation Measure will therefore include mitigation of bird bycatch from gillnet fisheries. All of the above proposed mitigation types are considered as potentially suitable for gillnets and will be evaluated as suitable mitigation techniques.

2.3.1.2 There is some anecdotal evidence and research (Northridge et al., 2020) that mid-water trawling may also result in significant levels of bird bycatch. However, there is less evidence to support this. Evidence gathering by the Applicant is ongoing for mid-water trawl bycatch. There is not enough evidence to demonstrate the efficacy of above water deterrents as mitigation for mid-water trawls at the moment. However, currently all above mitigation methods are being considered for mid-water trawling.

## 2.4 Location

2.4.1.1 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 mitigation measure locations.

- 2.4.1.2 Potential fisheries with reported bird bycatch and population connectivity with the wider site network and include the UK South coast, Cornwall, and the Thames Estuary. All of these locations are being considered for potential mitigation trials and future implementation.). Bycatch hotspots have been identified in both the South East and South West of the UK, along with reports of bird bycatch at other locations along the south coast and in the Thames Estuary. Site plans [Figure 5](#) and [Figure 6](#) show the areas where fishing may take place and where mitigation trials may be targeted.

### 2.4.1.3

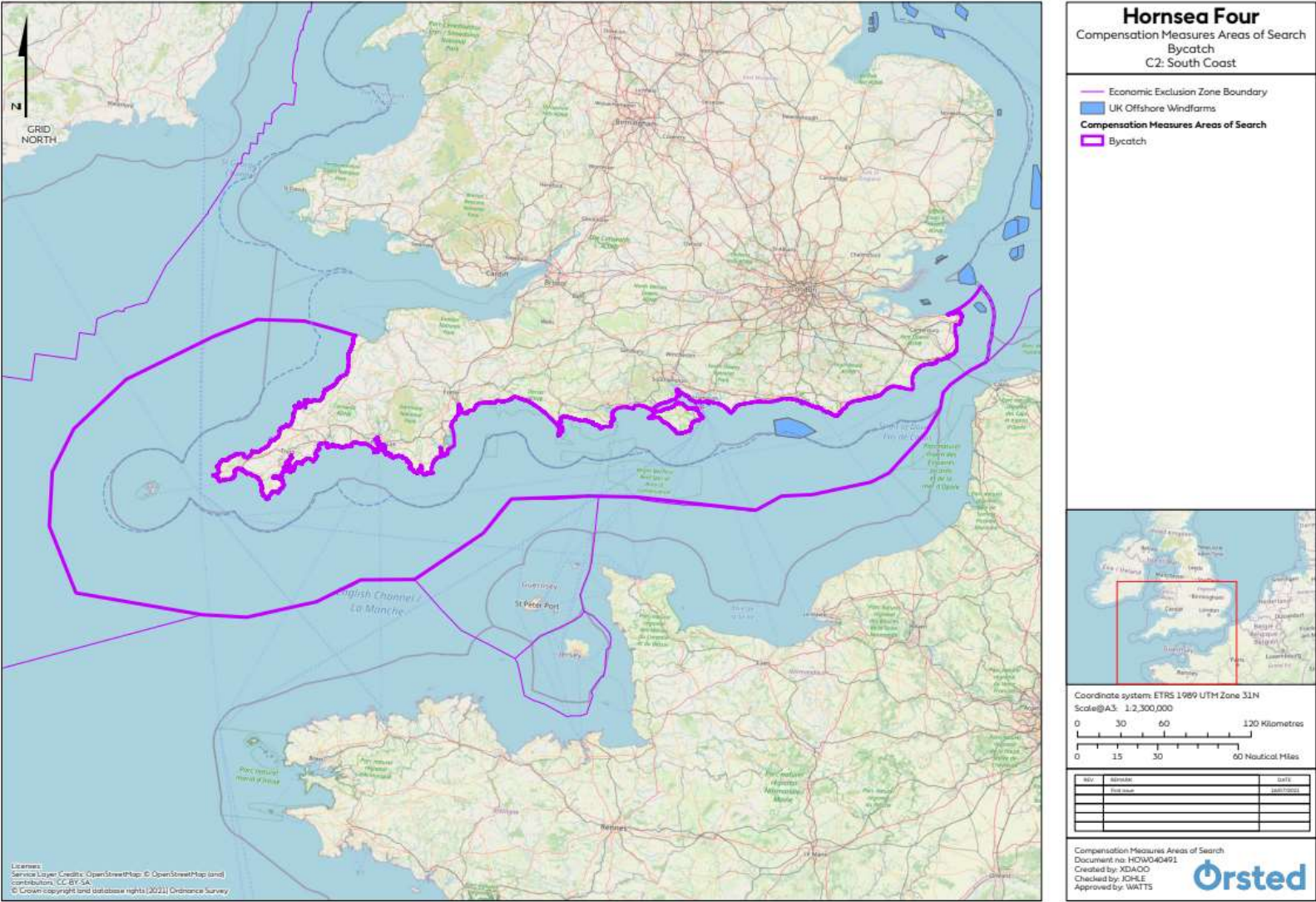


Figure 5: South Coast Bycatch Mitigation Search Area.

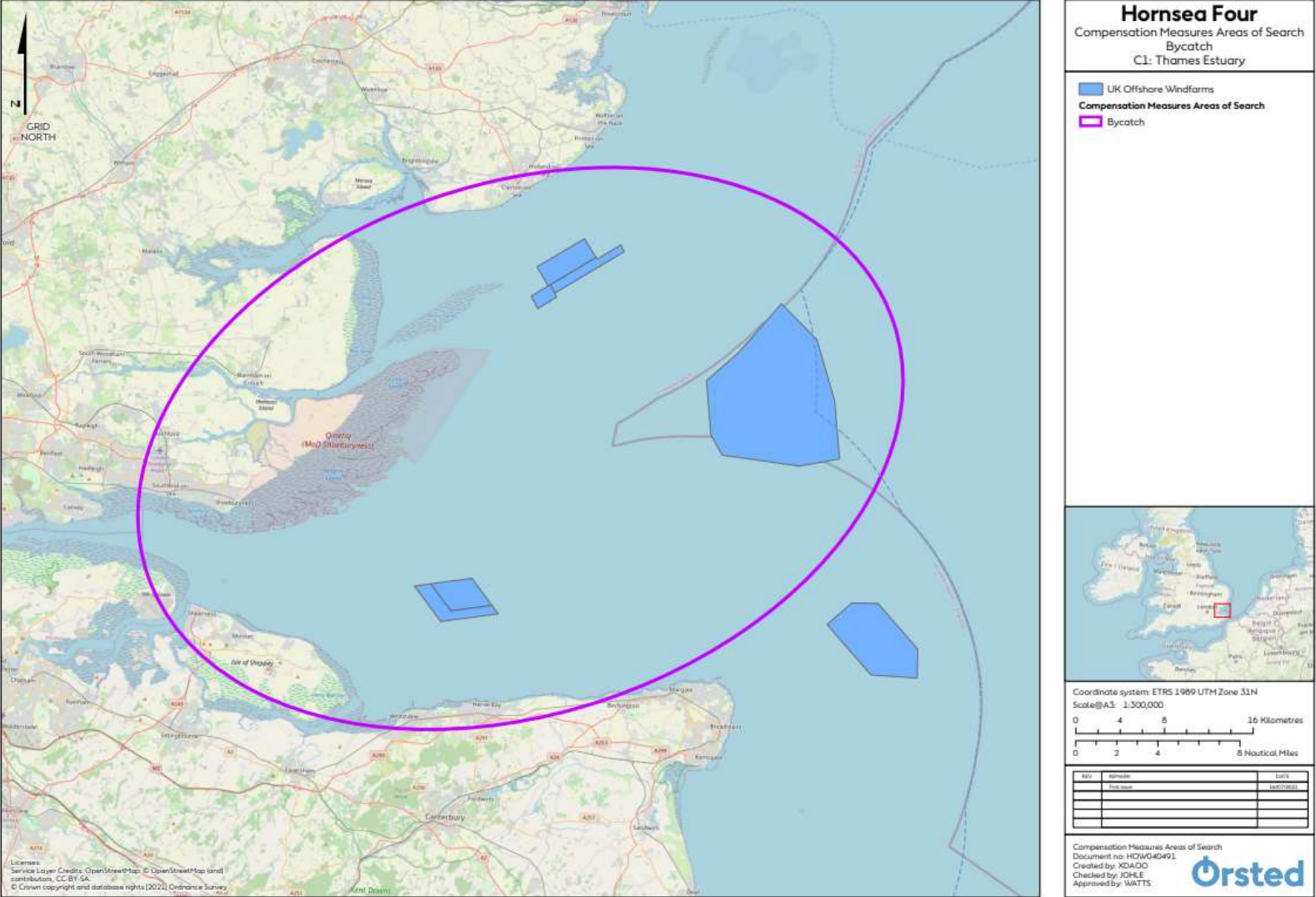


Figure 6: Thames Estuary Bycatch Mitigation Search Area.

## 2.5 Implementation, operation, and monitoring

- 2.5.1.1 Mitigation trials are planned for Autumn / Winter 2021. Following trials to gather further evidence on the efficacy of each mitigation method, a specific measure or combination of measures will be selected to take forward. Implementation of the planned mitigation will begin following determination of the DCO application by the Secretary of State.
- 2.5.1.2 Work will be undertaken with local representatives and contacts within the target fishery areas to ensure uptake of the mitigation equipment. Use of the equipment may need to be incentivised to ensure uptake and continued usage.
- 2.5.1.3 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 will be decided based upon further evidence gathering and discussion with industry experts.
- 2.5.1.4 The Wind Farm is expected to operate for 35 years following construction. If required, the accepted mitigation 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 mitigation measure, the equipment may continue to be used as a mitigation deterrent.

## 2.6 Other projects and trials

- 2.6.1.1 There are currently trials of mitigation measures planned around the UK by other organisations. Exact details of these are not available, However the details currently known to the Applicant are trials that may be undertaken in 2021 or 2022 in both Cornwall and Scotland with the Looming Eye Buoy.

## 2.7 Summary of Bycatch Compensation Measure

- 2.7.1.1 Bycatch reduction is a primary Compensation Measure. In-combination with other primary razorbill and guillemot measures, bycatch mitigation will be able to deliver the required level of compensation for Hornsea Four. A detailed evidence report, and roadmap will be submitted with the DCO application to demonstrate the potential compensation deliverable by the bycatch mitigation both alone and combined with the other primary Compensation Measures. The evidence report will include a summary of the supporting evidence for bycatch compensation and the roadmap will outline the further steps that will be undertaken from submission to demonstrate that the Compensation Measure can be delivered. 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 academics, Natural England, the RSPB, fisheries representatives and other relevant stakeholders to ensure this Compensation Measure is both robust and deliverable.



## 3 References

### 3.1 Introduction

APEM, (2021) Proof of Concept (PoC) aerial survey of offshore structure. Report to Hornsea Four.

Niras, (2021) Boat-based survey of oil and gas structures in the southern North Sea. Report to Hornsea Four.

### 3.2 Bycatch

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