



Hornsea Project Four

Volume B2, Chapter 5: Habitats Regulations Assessment Without Prejudice Derogation Case Part 1-3

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Glossary

Term	Definition
Appropriate Assessment (AA)	An assessment to determine the implications of a plan or project on a European site in view of the site's Conservation Objectives. An AA forms part of the Habitats Regulations Assessment and is required when a plan or project is likely to have a significant effect on a European site.
Compensation / Compensatory Measures	If an Adverse Effect on the Integrity on a designated site is determined during the Secretary of State's Appropriate Assessment, compensatory measures for the impacted site (and relevant features) will be required. The term compensatory measures is not defined in the Habitats Regulations. Compensatory measures are however, considered to comprise those measures which are independent of the project, including any associated mitigation measures, and are intended to offset the negative effects of the plan or project so that the overall ecological coherence of the national site network is maintained.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Projects (NSIP).
HRA Derogation Provisions	Provisions set out under Regulations 64 and 68 of the Conservation of Habitats and Species Regulations 2017 and Regulations 29 and 36 of the Conservation of Offshore Marine Habitats and Species Regulations 2017 that permit a plan or project with AEol on a European site(s) to be consented provided the tests derived from Article 6(4) are met i.e., there are no alternative solutions, there are imperative reasons of overriding public interest and that necessary compensation measures are secured.
European site	A Special Area of Conservation (SAC) or candidate SAC (cSAC), a Special Protection Area (SPA) or a site listed as a Site of Community Importance (SCI). Potential SPAs (pSPAs), possible SACs (pSACs) and Ramsar sites are also afforded the same protection as European sites by the National Planning Policy Framework – para 176 (Ministry of Housing, Communities and Local Government, 2019). European offshore marine sites are also referred to as "European sites" for the purposes of this document.
Habitats Directive	European Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora
Habitats Regulations	The Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017
Habitats Regulations Assessment (HRA)	A process which helps determine likely significant effects and (where appropriate) assesses adverse impacts on the integrity of European sites. The process consists of up to four stages: screening, appropriate assessment, assessment of alternative solutions and assessment of imperative reasons of over-riding public interest (IROPI) and compensatory measures
Hornsea Project Four Offshore Wind Farm	The proposed Hornsea Project Four Offshore Wind Farm project. 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.
In-Combination Effect	The effect of Hornsea Four in-combination with the effects from other plans and projects on the same feature/receptor.

Term	Definition
National Site Network	The network of European Sites in the UK. Prior to the UK's exit from the EU and the coming into force of the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 these sites formed part of the EU ecological network known as "Natura 2000".
Nature Directives	The EU Habitats Directive (European Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora) and EU Wild Birds Directive (79/409/EEC amended in 2009 to become Directive 2009/147/EC)
Net zero by 2050 commitment	The UK governments legally binding target of achieving net zero greenhouse gas emissions by 2050 as set out in the Climate Change Act 2008 (2050 Target Amendment) Order 2019
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).
Report to Inform Appropriate Assessment	The information that the Competent Authority needs to inform an Appropriate Assessment at Stage 2 of the HRA process, and which has been provided by the Applicant in the RIAA (Volume B2, Chapter 2: Report to Inform Appropriate Assessment).
Special Area of Conservation (SAC)	Strictly protected sites designated pursuant to Article 3 of the Habitats Directive (via the Habitats Regulations) for habitats listed on Annex I and species listed on Annex II of the directive.
Special Protection Area (SPA)	Strictly protected sites designated pursuant to Article 4 of the Birds Directive (via the Habitats Regulations) for species listed on Annex I of the Directive and for regularly occurring migratory species.

Acronyms

Acronym	Definition
AA	Appropriate Assessment
AMEP	Able Marine Energy Park
AEoI	Adverse Effect on Integrity
AfL	Area for Lease
BDMPs	Biologically Defined Minimum Population Scales
BEIS	Business Energy and Industrial Strategy
BTEC	Business and Technology Education Council
CO ₂	Carbon dioxide
CCUS	Carbon Capture Usage and Storage
CCC	Committee on Climate Change
CEFAS	Centre for Environment, Fisheries and Aquaculture Science.
CCA2008	Climate Change Act 2008
CfD	Contract for Difference
CRM	Collision risk modelling
DECC	Department. of Energy and Climate Change
DAA	Developable Area Approach
DCO	Development Consent Order
DEFRA	Department for Environment, Food and Rural Affairs
dDCO	Draft Development Consent Order
EC	European Commission
EEZ	Exclusive Economic Zone
ES	Environmental Statement
EIA	Environmental Impact Assessment
ESO	Electricity System Operator
EU	European Union
ExA	Examining Authority
FFC	Flamborough and Filey Coast
FTE	Full Time Employees
GB	Great Britain
GVA	Gross Value Added
HPC	Hinkley Point C
HRA	Habitats Regulations Assessment
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
HSE	Health, Safety and Environment
IPCC	Intergovernmental Panel on Climate Change
IROPI	Imperative Reasons of Overriding Public Interest
JNCC	Joint Nature Conservation Committee
LAT	Lowest astronomical tide
LCoE	Levelized Cost of Energy
LEP	Local Enterprise Partnerships

Acronym	Definition
LSE	Likely Significant Effects
MDS	Maximum Design Scenario
MSL	Mean sea level
MN 2000	Managing Natura 2000 Sites
MMO	Marine Management Organisation
MOET	Maintenance and Operations Engineering Technician
MPA	Marine Protected Areas
NETS	National Electricity Transmission System
NGESO	National Grid Electricity System Operator
NSIP	Nationally Significant Infrastructure Project
NPS	National Policy Statement
NE	Natural England
O&M	Operation and Maintenance (project phase)
OWF	Offshore Wind Farm
PEIR	Preliminary Environmental Information Report
PINS	The Planning Inspectorate
PVA	Population Viability Analysis
RIAA	Report to Inform an Appropriate Assessment
RSPB	Royal Society for the Protection of Birds
SAC	Special Areas of Conservation
SEA	Strategic Environmental Appraisals
SEZ	Shipping Exclusion Zone
SNCB	Statutory Nature Conservation Body
STEM	Science Technology Engineering and Maths
STW	Scottish Territorial Waters
SoS	Secretary of State
SPA	Special Protection Area
TCE	The Crown Estate
TWT	The Wildlife Trusts
SPA	Special Protection Area
UK	United Kingdom
WTG	Wind Turbine Generator
ZDA	Zone Development Agreement

Units

Unit	Definition
GW	Gigawatt
km	Kilometre
kV	Kilovolt
m	metre
MW	Megawatt
TWh	Terawatt-hour

Part 1: Background Information

Legal and project context and HRA process surrounding the application of Article 6 (4)

1 Introduction

1.1 Project Overview

1.1.1.1 Orsted Hornsea Project Four Limited (the 'Applicant') is proposing to develop the Hornsea Project Four Offshore Wind Farm (hereafter 'Hornsea Four'). Hornsea Four will be located approximately 69 km offshore (at its closest point) from Flamborough Head on the Yorkshire coast 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 on to an onshore substation with electrical balancing infrastructure, and connection to the electricity transmission network.

1.2 Process to Date

1.2.1.1 Hornsea Four has an expected capacity of greater than 100 megawatts (MW) and is therefore defined as a Nationally Significant Infrastructure Project (NSIP) under Section 15(3) of the Planning Act 2008 (the '2008 Act'). As such there is a requirement to apply for a Development Consent Order (DCO) to the Planning Inspectorate (PINS), who administer the examination of applications on behalf of the relevant Secretary of State (SoS).

1.2.1.2 Following an extensive program of pre-application consultation, an Application for a DCO (the "Application") is being submitted to PINS in September 2021. -If accepted, the Application will be examined by the Examining Authority (ExA), that will make a recommendation to the SoS for Business Energy and Industrial Strategy (BEIS). -The SoS will review and comment on this recommendation before determining whether to grant a DCO for Hornsea Four.

1.2.1.3 The Applicant is required to present such information as the Competent Authority (in this case, the SoS for BEIS), may reasonably require enabling it to undertake a Habitats Regulations Assessment (HRA).- This is to determine if Hornsea Four may affect a European designated site in accordance with the provisions of the Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (the "Habitats Regulations").

1.2.1.4 The Applicant has therefore provided information to support a HRA of Hornsea Four, specifically, an Appropriate Assessment (AA) documented in the Report to Inform an Appropriate Assessment ("the RIAA") (**Volume B2, Annex 2: Report to Inform Appropriate Assessment**). In accordance with the Habitats Regulations, the RIAA considers whether Hornsea Four could result in an Adverse Effect on Integrity ("AEoI") on a conservation site of European importance (European site), either alone or in-combination with other plans and projects (the Applicant's position is set out in **Section 2.1**). -The Applicant's evidence presented within the RIAA (submitted with the DCO Application) concluded that Hornsea Four will not have an AEoI on any European site, either alone or in combination.

1.2.1.5 However, in relation to the kittiwake feature, the Applicant has since carefully reviewed the Secretary of State's HRA for Norfolk Boreas and notes that the finding that the kittiwake

population would continue to grow has not been accepted by the Secretary of State as a basis to exclude AEOI/AEol for Norfolk Boreas. Specifically, the Applicant notes that the Secretary of State's HRA (which did not include Hornsea Four or Sheringham and Dudgeon Extensions in the in-combination totals) states:

"Furthermore, if the mortality from the windfarms is 432 adults per year, then the population of the SPA after 30 years will be 14.3% lower than it would have been in the absence of the Projects and the population growth rate would be reduced by 0.5%. This reduction in the population would be counter to the restore conservation objective for this feature of the SPA and would result in an adverse effect on the integrity of the site." (emphasis added).

1.2.1.6 Continued growth in the population of kittiwake at the FFC SPA, albeit at a reduced rate, was a factor relied upon by the Applicant to support its position that there would be no AEOI/AEol in-combination in respect of kittiwake at the FFC SPA. However, the Secretary of State, on advice from Natural England, has reached the alternative conclusion in the context of Norfolk Boreas.

~~1.2.1.4~~ The Applicant therefore considers that an AEOI/AEol cannot be ruled out with regards to the kittiwake feature of FFC SPA from Hornsea Four, in-combination with other plans and projects.

~~1.2.1.5~~ 1.2.1.7 For the avoidance of doubt, the Applicant's position remains that there will be no AEol from Hornsea Four alone on the kittiwake feature and, aside from the overall (in combination) conclusion on integrity noted above, the Applicant maintains its position in all other respects as regards its methodology and assessment of the effects on the FFC SPA features. The Applicant also maintains its position of no AEol alone or in combination for all other qualifying species of the FFC SPA and for all other European sites.

~~1.2.1.6~~ 1.2.1.8 During the consideration of the Application for Hornsea Three Offshore Wind Farm (Hornsea Three)¹, the SoS clarified the importance of i) identifying the potential for adverse impacts on the integrity of designated sites during the pre-application period and ii) considering the need for derogation of the Habitats Regulations during the examination, where there is potential for AEOI/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 the examination. -The SoS was clear that this does not necessarily require that agreement is reached between the Applicant and the SNCBs on the potential for significant

¹ See para 6.3 of the letter of the Department for Business, Energy & Industrial Strategy Decision Letter for Hornsea dated 31 December 2020. Available [here](#)

adverse impacts on designated sites and evidence relating to derogation can be provided on a "without prejudice" basis, as the final decision on such matters remains for the SoS.²

1.3 Habitats Regulations Assessment (post EU-Exit)

1.3.1.1 The requirement for HRA follows from the EU Habitats Directive³ and, by virtue of Article 8 of that Directive, also the Wild Birds Directive⁴ (the Nature Directives). The wording of Article 6(3) and 6(4) of the Habitats Directive underlies the sequential decision-making tests applied under the HRA process to projects likely to significantly affect European sites. Following the United Kingdom's (UK) departure from the European Union (EU) on 31 December 2020 (EU Exit), the UK is no longer an EU Member State. Notwithstanding, the Directive (via the "Habitats Regulations) continue to provide the legislative backdrop for HRA in the UK. Through the Conservation of Habitats and species Amendment (EU Exit) Regulations 2019 ("EU Exit Regulations"), the HRA process implemented under the Habitats Regulations continues to apply (subject to minor changes).- The UK is also bound by HRA judgments handed down by The Court of Justice of the European Union (CJEU) prior ~~to~~ 31 December 2020, subject to limited exceptions⁵.

1.3.1.2 Accordingly, the EU Exit Regulations are considered to have no material bearing on the requirement or process for the HRA of Hornsea Four. The Applicant will comply with the requirements of Habitat Regulations other than where specific changes are identified by the government. -In accordance with the present position on HRA terminology (Defra, 2021a⁶), this report will still refer to "the Habitats Regulations", "European sites" and HRA caselaw⁷. However, European sites in the UK are collectively termed the "National Site Network" and no longer form part of the Natura 2000 network. The HRA will not refer to any obligations under the Nature Directives but may have regard to European Commission (EC) guidance, so far as it is relevant. -The implication of the UK's departure from the EU (EU-Exit) is discussed further in [Section 3.3](#).

1.4 Summary of Consultation

1.4.1.1 The Applicant recognises the importance of engaging with the relevant stakeholders with respect to Article 6(4) and the development of any potential compensation measures, as their knowledge is important. The Applicant has therefore sought to engage openly and transparently with the key stakeholders.

1.4.1.2 Consultation on the Derogation Provisions has been ongoing in the latter stages of the pre-application stage through a series of eight online workshops. These online consultations were employed during the COVID-19 pandemic to substitute meetings in-person. The

² See para 6.4 of the letter of the Department for Business, Energy & Industrial Strategy Decision Letter for Hornsea dated 31 December 2020. Available [here](#)

³ Council Directive 92/43 /EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ L 206/7 22.7.1992) (the Habitats Directive)

⁴ Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (OJ L 20/7 26.1.2010) (the Birds Directive)

⁵ [Section 6 of the European Union \(Withdrawal\) Act 2018](#)

⁶ Department for Environment Food & Rural Affairs (DEFRA). 2021. Policy paper 'Changes to the Habitats Regulations 2017' Published 1 January 2021. Accessed April 2021. Available [here](#).

⁷ [from before 31 December 2020](#)

Evidence Plan Process has been followed during the drafting of the without prejudice derogation case and included a number of relevant authorities and stakeholders.

1.4.1.3 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 variously by Natural England, the Marine Management Organisation (MMO), PINS, the Department for Environment, Food and Rural Affairs (Defra), the Joint Nature Conservation Committee (JNCC), the Crown Estate (TCE) and the Royal Society for the Protection of Birds (RSPB). -A full report of consultation carried out specifically with regard to derogation and compensation matters (including the Applicant's responses) is provided in [Volume B1, Chapter 1: Consultation Report](#). A summary of the wider consultation process carried out for the project as a whole is set out in the ES ([Volume A1, Chapter 6: Consultation](#)).

1.5 The Derogation Provisions of the Habitats Regulations

1.5.1.1 The Habitats Directive⁸ acknowledges that there may be imperative reasons of overriding public interest for some plans and projects to proceed i.e., the public interest in the plan or project can outweigh the possible harm to a European site, provided that harm is adequately compensated. The Directive provides a derogation under Article 6(4) that allows projects that may have an AEoI to be consented.

1.5.1.2 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.

1.5.1.3 The derogation tests thereby underpin a three-step process (see [Section 3](#)), which are hereafter referred to as the "HRA Derogation Provisions".

1.6 The Purpose and Scope of this Submission

1.6.1.1 This report constitutes a "without prejudice derogation case" for Hornsea Four and forms part of the application for development consent. Its purpose is to provide, without prejudice, information to demonstrate that the Article 6 (4) derogation tests could be met for Hornsea Four if it is necessary to resort to them to authorise the project (see [Section 3](#)).

1.6.1.2 The without prejudice derogation case comprises three parts. [Part 1](#) provides the legal context and HRA process surrounding the application of Article 6 (4). [Parts 2](#) and [3](#) evidence the first two derogation tests set out in Article 6 (4) and demonstrate that there are no

⁸ [EC Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.](#)

alternatives to Hornsea Four and the project is needed for imperative reasons of overriding public interest.

- 1.6.1.3 An overview report on compensatory measures (**Volume B2, Chapter 6: Compensation measures for FFC SPA: Overview**) has also been produced with respect to the third test (see **Section 2.2**). ~~As previously stated, it is the Applicant's position that Hornsea Four will not have an AEO/AEol on any European site, either alone or in combination. However,~~ noting the SoS guidance issued with the decision for Hornsea Three (set out in paragraph ~~1.2.1.5 1.2.1.8 1.2.1.8 1.2.1.7 1.2.1.8~~) regarding the importance of pre-application consultation on matters relating to potential ~~AEO/AEol~~ (including compensation) and the SoS decision/ guidance (in relation to kittiwake) for Norfolk Boreas (set out in paragraph 1.2.1.5 1.2.1.5 1.2.1.5 1.2.1.5) -the Applicant ~~has~~ provided a without prejudice derogation case for ~~four~~ seabird features of one European site: the Flamborough and Filey Coast Special Protection Area (FFC SPA). Due to the position regarding the conclusion of AEol in-combination for kittiwake (set out in paragraph 1.2.1.8 1.2.1.8 1.2.1.7), the derogation case for kittiwake is no longer provided on a 'without prejudice' basis.
- 1.6.1.4 Within the RIAA (**Volume B2, Annex 2: Report to Inform Appropriate Assessment**), Likely Significant Effects (LSE) were identified for a number of European sites. ~~From the 'screened through in' sites, and, as stated above, it is the Applicant's position that Hornsea Four will not have an AEO/AEol on any European site, either alone or in combination. However,~~ there is one site (which is the FFC SPA) which as a result of consultation with SNCBs (and others), the Applicant considers that there is a risk of the SoS concluding ~~AEO/AEol~~ in-combination with other plans or projects.- The scope of this report has therefore been limited to that site - the FFC SPA.- The scope of the without prejudice derogation case is focused only on the features and impact pathways set out in ~~Table 1-1 Table 1-1 Table 1-1~~. The decision by the Secretary of State for Hornsea Three is acknowledged in section 1.4 of the RIAA (**Volume B2, Annex 2: Report to Inform Appropriate Assessment**), including the justification for the re-assessment of the potential for an ~~AEO/AEol~~ on the kittiwake feature of the FFC SPA for Hornsea Four.

Table 1-1: Relevant European Site Features and Impact Pathways

European sites	Qualifying Feature	Relevant impact pathway from Hornsea Four
Flamborough and Filey Coast Special Protection Area (FFC SPA)	Kittiwake (Breeding)	Collision risk mortality
	Gannet (Breeding)	Collision risk mortality Displacement and disturbance mortality Combined impact of collision & displacement
	Guillemot (Breeding)	Displacement and disturbance mortality Barrier effects
	Razorbill (Breeding)	Displacement and displacement mortality Barrier effects

1.7 The Structure of This Report

1.7.1.1 This report is structured as follows:

- **Part 1 (Sections 1 - 7)** provides the legal context and HRA process surrounding the application of Article 6 (4) and sets out:
 - I. An overview of the legal context and HRA process (**Section 3** below)
 - II. Relevant European site features (**Section 5**) below) and
 - III. Potential impacts on the relevant features of FFC SPA (**Section 6**).
- **Part 2 (Sections 8 - 14)** comprises a **Report to Demonstrate No Alternatives Solutions**. This part examines whether there are any feasible alternative solutions to Hornsea Four that meet its core project objectives and concludes that there are none.
- **Part 3 (Sections 15 - 17)** comprises a **Report to Demonstrate Imperative Reasons of Overriding Public Interest**. This part identifies the IROPI that would enable a decision by the SoS to authorise to Hornsea Four notwithstanding a conclusion of **AEQ/AEol**.

Table 1-2 Other application documents relevant to the derogation case

Document title	Environmental Statement			Application document no.
	Volume	Chapter	Annex	
Draft Development Consent Order	1	1	-	C1.1
Evidence Plan Report	1	1	1	B1.1.1 RP
Summary Statement (as part of the derogation)	2	4	-	B2.4
Record of Consultation (on Article 6 (4))	2	9	-	H2.3 B2.9
Report to Inform Appropriate Assessment	2	2	-	B2.2
Statement of Need	1	6	-	H2.6 F1.6
Commitments Register	4	5	2	A4.5.2
Outline Employment and Skills Plan	2	18	-	F2.18
Onshore Environmental Assessment: Socioeconomics	3	10	-	A3.10

2 The Precautionary Basis of this Submission

2.1 The Applicant's Primary Position

- 2.1.1.1 Information is provided in the RIAA (**Volume B2, Annex 2: Report to Inform Appropriate Assessment**) that enables an assessment of each species listed in ~~Table 1-1~~**Table 1-1**. The Hornsea Four Derogation Case is provided **without prejudice** to the Applicant's firm position that it can be concluded beyond reasonable scientific doubt that Hornsea Four will not give rise to any AEol, alone or in combination with other projects or plans – with the exclusion of the FFC SPA kittiwake feature as explained in paragraph 1.2.1.57. Comprehensive evidence to support the Applicant's conclusion is set out within the

Applicant's RIAA ([Volume B2, Annex 2: Report to Inform Appropriate Assessment](#)) and its [annexes \(A - G\)](#) as summarised in [Section 6](#) of this report.

2.1.1.2 The Applicant does not accept that the application of the HRA Derogation Provisions is necessary ([notwithstanding the Applicant's position regarding kittiwake](#)), but has provided (with reference to the comments made for the decision on Hornsea Three (see paragraph [1.2.1.5](#)~~1.2.1.8~~~~1.2.1.8~~~~1.2.1.7~~~~1.2.1.8~~) the information necessary to support a clear and overriding HRA derogation case for Hornsea Four, which could be relied upon by the SoS if required.

2.2 Report on Compensatory Measures

2.2.1.1 A standalone report on compensatory measures ([Volume B2, Chapter 6: Compensation measures for FFC SPA: Overview](#)) has also been produced and submitted with the Application. The Applicant has been actively investigating a range of feasible compensation measures with the aim of reducing anthropogenic and natural pressures on the relevant qualifying features of the FFC SPA to compensate for the potential effects of Hornsea Four on said species.

2.2.1.2 The Applicant provides the report on compensatory measures ([Volume B2, Chapter 6: Compensation measures for FFC SPA: Overview](#)) with reference to the following assurances from the SoS during the Decision on Hornsea Three:⁹

- i. "Applicants should be assured that where they disagree with SNCBs and maintain a position that there are no significant adverse impacts but provide evidence of possible compensatory measures for consideration at the examination on a "without prejudice" basis, both the ExA in the examination and the Secretary of State in the decision period will give full and proper consideration to the question of whether there are or are not significant adverse impacts. It will not be assumed that the provision of information regarding possible compensatory measures signifies agreement as to the existence of significant adverse impacts."

[2.2.1.3](#) A long-list of compensation measures has been considered and measures ranked in terms of feasibility through a system of detailed review and consultation. Consultation on those measures that have been progressed through the Evidence Plan process and this system is ongoing. Measures considered include artificial nesting sites, predator eradication, bycatch reduction and consideration of seabird prey availability. The Applicant is regularly engaging with key stakeholders, including Natural England, the MMO and the RSPB (see [Section: 1.4](#) and the [B2.9 Record of Consultation](#) reported in the derogation information to discuss and seek feedback on these proposed compensation measures. The report on compensatory measures ([Volume B2, Chapter 6: Compensation measures for FFC SPA: Overview](#)) presents

⁹ See para 6.4 of the letter of the Department for Business, Energy & Industrial Strategy Decision Letter for Hornsea dated 31 December 2020. Available [here](#)

feasible compensation measures to ensure the coherence of the National Site Network¹⁰ should the SoS reach a conclusion of AEol.

[2.2.1.4 Note—Please note, in line with the Applicant’s new position with regards kittiwake \(see paragraph 1.2.1.5\), whilst compensation measures for guillemot, razorbill and gannet features of FFC SPA are presented on a ‘without prejudice’ basis, compensation measures for kittiwake are no longer presented on a without prejudice basis.](#)

2.3 Supporting Information

2.3.1.1 This document refers to material that has been submitted as part of the Application. For brevity, this information is not reproduced in full here, where references are made to material submitted as part of the Application.

2.3.1.2 A list of the documents supporting the without prejudice derogation case is provided in [Table 1 2](#).

3 The Legal Framework and HRA Process

3.1 Background: The Habitats Directive

3.1.1.1 The Habitat Regulations transposed into UK law the requirements of the Habitats Directive¹¹. Although the UK left the European Union (EU) on 31 January 2020, the Habitats Directive provides the legislative backdrop to the Habitats Regulations.

3.1.1.2 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.”¹² 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.

3.1.1.3 The National Site Network comprises of European sites in the UK that formed part of the Natura 2000 network immediately before 31 December 2020. The Habitats Regulations define European sites as Special Areas of Conservation (SAC), Sites of Community Importance (SCI), proposed sites (candidate SACs) and SPAs. Potential SPAs (pSPAs), possible SACs (pSACs) and Ramsar sites are also afforded the same protection as European sites by UK government policy. (para. 176 of the National Planning Policy Framework). European offshore marine sites are also referred to as “European sites” for the purposes of this document.

3.1.1.4 The term ‘European offshore marine site’ refers to European sites located within the offshore marine area (including any part of the continental shelf) and the term “European site” is used in this document to refer to European sites and European offshore marine sites. Defra has

¹⁰ Regulations 4 and 33, EU Exit Regulations.

¹¹ EC Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.

¹² Previously the Natura 2000 Network renamed as stipulated in the EU Exit Regulations 4 and 33, EU Exit

confirmed that following EU-Exit, Ramsar sites remain protected in the same way as SACs and SPAs, but do not form part of the National Site Network (Defra, 2021a).

3.2 Articles 6(3) and 6(4): Authorisation of Plans and Projects

- 3.2.1.1 The requirements concerning the authorisation of plans or projects which may adversely affect European sites are contained in Articles 6(3) and 6(4) of the Habitats Directive and set out in full in [Table 3-1](#)~~Table 3-1~~~~Table 3-1~~.

Table 3-1: Legal Text of Articles 6 (3) and 6 (4)**Article 6 (3)**

"Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4 (i.e., Art. 6(4)), the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."

Article 6 (4)

"If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted. Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission to other imperative reasons of overriding public interest."

3.3 The HRA Process

- 3.3.1.1 The process encompassing the requirements of Articles 6(3) and 6(4) is commonly referred to as HRA. PINS Advice Note Ten¹³ describes HRA as "multi-staged" and indicates that it consists of four¹⁴ principal stages, reproduced in **Table 3-2** below (see **Figure 1** in Advice Note Ten).
- 3.3.1.2 HRA is generally described as a sequential process, as Article 6(4) is consequent upon and follows from a negative outcome to Article 6(3). In practice, there can be a degree of overlap between stages and PINS Advice Note Ten recognises that the process can be "iterative".

Table 3-2: HRA Process Relative to Legal Text of Articles 6(3) and 6(4), Habitats Directive

Habitats Directive Provision	HRA stages (per PINS Advice Note Ten)
Article 6(3)	Stage 1 - Screening for Likely Significant Effects (LSE)
	Stage 2 – Appropriate Assessment (AA)
Article 6(3)	Stage 3 – Assessment of Alternatives
	Stage 4 – Consideration of IROPI and compensatory measures

3.4 The UK Habitats Regulations

- 3.4.1.1 The applicable requirements of the Habitats Directive were transposed into UK legislation through the Habitats Regulations). The relevant provisions in the two sets of Habitats

¹³ Version 8, republished November 2017. Available [here](#)

¹⁴ See Figure 1 in PINS Advice Note Ten. It is assumed in AN10 that the project in question is not directly connected with or necessary to the management of the European site in question. That is true of Hornsea Four.

Regulations are materially the same and there is no legal or practical need to differentiate between them in this submission.

3.5 HRA Stages 1 and 2

3.5.1.1 The need for and application of the HRA Derogation Provisions flows from the outputs of HRA Stages 1 and 2. The requirements of Stages 3 and 4 are applied based upon the nature and the extent of any AEol identified through Stages 1 and 2. HRA Stages 1 and 2 require that any project¹⁵ likely to have a significant effect on a European site (alone or in combination) must be subject to an AA of the implications for that European site in view of the site's conservation objectives. Subject to the HRA Derogation Provisions (Stages 3 and 4), the project must not be authorised if it is concluded, based on the AA, that there would be an AEol of any European site(s).

3.6 Applicant's Stages 1 and 2 Conclusions

3.6.1.1 The RIAA ([Volume B2, Annex 2: Report to Inform Appropriate Assessment](#)) submitted by the Applicant, (and screening and integrity matrices), sets out the methodology and evidence of the Applicant in respect of HRA Stages 1 and 2, applying the above legal principles.

3.6.1.2 In respect of the Maximum Design Scenario (MDS) at Application-stage, the RIAA ([Volume B2, Annex 2: Report to Inform Appropriate Assessment](#)) concluded that Likely Significant Effects (LSE) (HRA Stage 1) as a result of Hornsea Four could not be discounted in respect of the qualifying features of the FFC SPA and a shadow AA (HRA Stage 2) was undertaken.

3.6.1.3 Having regard to the mitigation secured by the requirements listed on the project's Commitments Register ([Volume A4, Chapter 5, Annex 2: Commitments Register](#)) and conditions of the DCO/Deemed Marine Licence, the Applicant's RIAA ([Volume B2, Annex 2: Report to Inform Appropriate Assessment](#)) concluded that Hornsea Four will not lead to any AEol in respect of ~~the gannet guillemot and razorbill any of the~~ features of the FFC SPA. However, on the basis as set out in paragraph 1.2.1.57 an adverse AEol in respect of the kittiwake feature cannot be ruled out.

3.7 HRA Stages 3 and 4

3.7.1.1 The HRA Derogation Provisions allow a project found to give rise to an AEol to be authorised, provided the SoS is satisfied that:

- There are no feasible "alternative solutions" to the project; and
- The project must proceed for IROPI.

3.7.1.2 The relevant statutory requirements are presented in [Table 3-3](#)~~Table 3-3~~~~Table 3-3~~.

¹⁵ The Habitats Regulations apply to plans as well as projects, but this submission is concerned specifically with a project.

Table 3-3: Regulations Relating to Alternative Solutions and IROPI (as amended post-Brexit)

Regulation	Considerations of overriding public interest
64(1)	<i>If the competent authority is satisfied that, there being no alternative solutions, the plan or project must be carried out for imperative reasons of overriding public interest (which, subject to paragraph (2), may be of a social or economic nature), it may agree to the plan or project notwithstanding a negative assessment of the implications for the European site or the European offshore marine site (as the case may be).</i>
64(2)	<i>(2) Where the site concerned hosts a priority natural habitat type or a priority species, the reasons referred to in paragraph (1) must be either- (a) reasons relating to human health, public safety, or beneficial consequences of primary importance to the environment; or (b) any other reasons which the competent authority, having due regard to the opinion of the appropriate authority, considers to be imperative reasons of overriding public interest.</i>

3.7.1.3 The approach taken by the Applicant with regard to "alternative solutions" is set out in detail in **Part 2: Report to Demonstrate No Alternatives**. Similarly, the Applicant's approach to IROPI is set out in **Part 3: Report to Demonstrate IROPI**.

3.7.1.4 If satisfied that there are no feasible alternative solutions and Hornsea Four must proceed for IROPI, the SoS will be under an obligation to ensure that any necessary compensatory measures are secured. The relevant statutory requirements in respect of compensation are set out in **Table 3-4**.

Table 3-4: Legal Text of Regulations Relating to Compensatory Measures (As Amended Post-Brexit)

Regulation	Considerations of overriding public interest
68(1)	<p>Where in accordance with regulation 68—</p> <p>(a) a plan or project is agreed to, notwithstanding a negative assessment of the implications for a European site or a European offshore marine site, or</p> <p>(b) a decision, or a consent, permission, or other authorisation, is affirmed on review, notwithstanding such an assessment,</p> <p>the appropriate authority must secure that any necessary compensatory measures are taken to ensure that the overall coherence of the national site network is protected.</p>

3.7.1.5 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).¹⁶
- Compensation can be delivered inside or outside a European site.¹⁷

3.7.1.6 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 SoS to determine what is "necessary" by way of compensation, acting reasonably and proportionately. The SoS may have regard to European Commission (EC) opinions and guidance but is not bound to follow them.

3.7.1.7 Following the UK's departure from the EU, Defra (2021) has issued guidance on the changes made by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 as they relate to HRA. With respect to compensation, no changes or stipulations are set out in the guidance other than to note that adaptations to the National Site Network may include the incorporation in the network of areas which compensate for the loss of other areas within the network as a result of a project proceeding for IROPI reasons. Thereby confirming that compensation can be delivered inside or outside a European site.

3.8 The Implications of Brexit

3.8.1.1 The UK exited the EU on 31 January 2020. As noted above, the EU Exit Regulations ensure the continued application of the Habitats Regulations and HRA process post-Brexit. The broad intention of the EU Exit Regulations is to ensure continuity after "exit day".

3.8.1.2 While the basic legal framework for HRA is maintained, there are technical changes to ensure continued operability. For example, functions previously undertaken by the EC in

¹⁶ Case C-521/12 Briels and Others, paragraphs 38 – 39.

¹⁷ Case C-521/12 Briels and Others, paragraphs 38 – 39

designating future European sites and providing opinions on IROPI have been transferred to UK Ministers.

- 3.8.1.3 The "business as usual" position is subject to the important caveat that, although the Habitats Regulations continue to use the term European sites, those sites now form part of a "National Site Network." References in the Habitats Regulations to the coherence of "Natura 2000" must now be read and construed as references to the coherence of the "National Site Network". Subject to that caveat, Brexit is not of material consequence to how the HRA process is applied to Hornsea Four.

4 Guidance Documents

4.1 Key Sources

- 4.1.1.1 The following UK and EC guidance documents address the HRA Derogation Provisions and are referred to in this submission, where applicable and appropriate:

- Department for Environment Food & Rural Affairs (Defra). Policy paper Changes to the Habitats Regulations 2017 - Published 1 January 2021 ("DEFRA, 2021a")
- Defra. Habitats regulations assessments: protecting a European site. Guidance. 24 February 2021. ("DEFRA, 2021b")
- Habitats Directive: guidance on the application of Article 6(4), Department for Environment, Food and Rural Affairs (DEFRA) December 2012 ("DEFRA 2012");
- Managing Natura 2000 Sites - The provisions of Article 6(3) of the 'Habitats' Directive 92/43/EEC (2000) ("MN 2000"), first published in 2000 and updated in November 2018;
- EC Methodological Guidance for the Habitats Directive: Assessment of plans and projects significantly affecting Natura 2000 sites, methodological guidance on the provisions of Articles 6(3) and 6(4) of the Habitats Directive (2000) ("EC Methodological Guidance");
- Planning Inspectorate (2017): Advice Note Ten: Habitat Regulations Assessment relevant to Nationally Significant Infrastructure Projects;
- EC (2019): Managing Natura 2000 sites: The provisions of Article 6 of the Habitats Directive 92/43/EEC; and
- EC (2007): Guidance document on Article 6(4) of the Habitats Directive 92/43/EEC: clarification of the concepts of Alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the Commission.
- Defra. Best practice guidance for developing compensatory measures in relation to Marine Protected Areas. July 2021. Version for consultation.

4.2 Status and Weight of UK and EC Guidance

- 4.2.1.1 Reference to EC guidance on the interpretation of key HRA concepts post EU-Exit appears optional. Section 6(2) of the EU (Withdrawal) Act 2018 (as amended) establishes that UK courts "may have regard to anything done by a EU entity [i.e., the European Commission] (...) so far as it is relevant". The appropriate authorities may publish guidance on meeting the management objectives for the UK's National Site Network (the 'Network Objectives'). No

such guidance has been identified and Defra (2021) has confirmed that existing guidance is still relevant.

5 Relevant Features and Condition of the European sites

5.1.1.1 The without prejudice derogation case has been developed with reference to the features and potential impacts on the FFC SPA listed previously in ~~Table 1-1~~~~Table 1-1~~~~Table 1-1~~. AEol has been discounted with respect to the gannet, razorbill and guillemot ~~all four features in all cases~~, for the project alone and in-combination, ~~however AEOI~~AEol with respect to kittiwake in-combination cannot be ruled out (**Volume B2, Annex 2: Report to Inform Appropriate Assessment**).

5.1.1.2 Detailed information about the site, these relevant features, the conservation objectives, including the range of ecological attributes that are most likely to contribute to the site's overall integrity and the evidence base are submitted with the Application. Most notably within the RIAA (**Volume B2, Annex 2: Report to Inform Appropriate Assessment**), the technical reports and Environmental Statement (ES) chapters referenced therein and its Appendices A – I. The purpose of the derogation case is not to reiterate this information. An overview of the impacts identified for each species is provided in **Section 6**.

6 Impacts on European Site Features

6.1.1.1 The HRA Screening Report (included as Appendix A to **Volume B2, Annex 2: Report to Inform Appropriate Assessment**, with the conclusions summarised in Table 8.1 of that document) identified the potential for Likely Significant Effect (LSE) for the FFC SPA, with those relevant to the four species subject to the without prejudice derogation case summarised below:

- Kittiwake: Collision risk (operation phase);
- Gannet: Collision risk (operation phase), disturbance and displacement (all project phases) and collision and displacement combined (for the operation phase);
- Guillemot: disturbance and displacement (all project phases) and barrier effects (operation phase only); and
- Razorbill: disturbance and displacement (all project phases) and barrier effects (operation phase only).

6.1.1.2 Collision risk for seabirds may apply when birds fly through operational offshore windfarms (OWF) for example whilst foraging for food, commuting between breeding sites and foraging areas, or during migration. Collision risk refers to the potential for a bird(s) to collide with a turbine or its blades, with the potential for mortality to result.

6.1.1.3 The potential for birds to avoid an area due to the presence of turbines or vessels is referred to as disturbance and displacement. Disturbance and displacement effectively represents an indirect habitat loss, which would potentially reduce the area available to those seabirds to forage, loaf and / or moult. Displacement may contribute to individual birds experiencing fitness consequences, which at an extreme level could lead to the mortality of individuals.

6.1.1.4 The presence of wind turbine generators (WTG) could create a barrier, potentially resulting in birds flying around an array of turbines. The result would be an increase in the overall

distance flown than would otherwise have been the case if the wind turbines had not been present. The potential consequences are a change in time and energy budgets, which may impact for example on body condition or future survival prospects.

- 6.1.1.5 It should be noted that total predicted bird mortalities from the Environmental Statement (**Volume A2, Chapter 5: Offshore and Intertidal Ornithology**) will not be directly comparable to those apportioned to individual SPAs. This is a result of the total number of individual birds being apportioned to more than one SPA. For example, if the ES predicted 10 birds in total, with the RIAA (**Volume B2, Chapter 2: Report to Inform Appropriate Assessment**) needing to apportion these between 3 SPAs, then each individual SPA would be expected to have less than 10 birds apportioned to it. Detail on the apportionment is provided within the RIAA.
- 6.1.1.6 Consultation forms a key part of the application. Consultation on the RIAA has been undertaken through the Evidence Plan Process and documented in the Evidence Plan Report (**Volume B1, Annex 1.1: Evidence Plan**). This records points of agreement between the Statutory Nature Conservation Body (SNCB) and the Applicant that have been reached through a series of technical evidence plan meetings¹⁸. Consultation will be ongoing and will include Statements of Common Ground.
- 6.1.1.7 Within Section 10.4.4 of the RIAA (**Volume B2, Chapter 2: Report to Inform Appropriate Assessment**) it is acknowledged that in the operational phase of Hornsea Four, the presence of WTGs could create a barrier to the movements of seabirds. For birds breeding at the FFC SPA, routes between the breeding and foraging sites would, if the location of food resources is known, result in straight-out-and-back flights from the breeding cliffs to known foraging areas. For the Hornsea projects in general, and Hornsea Four specifically, to create a barrier to such flights then they/it would need to be sited across such flight lines and the bird species concerned would have to be known, or suspected, not to enter an operational wind farm (i.e., exhibit a high degree of avoidance). Given the location of the Hornsea projects it is flights in an almost due east-west alignment from the FFC SPA that would encounter the arrays once constructed.
- 6.1.1.8 The assessment of Hornsea Four and the potential for its construction and operation to create a barrier to the movement of seabirds breeding at the FFC SPA can be informed by knowledge of the existing routes that seabirds take as they commute back and forth from their breeding sites to forage offshore. As clearly presented in Figures 14 to 17 within the RIAA (**Volume B2, Chapter 2: Report to Inform Appropriate Assessment**) and described in Section 10.4.4 of that report, the Hornsea Four array area and 2 km buffer does not lie within an area of sea of importance, or between the colony and such an area of sea, regardless of

¹⁸ The Evidence Plan process is set out in the Environmental Statement (**Volume A1, Chapter 6: Consultation**).

the season for foraging, therefore the project would not restrict movements to key feeding areas or inhibit auks from utilising the waters considered to make up the Flamborough Front.

6.1.1.9 There is, therefore, no potential for an AEol to the conservation objectives of these two auks species in relation to a barrier effect. As this pathway would not be the basis of a derogation case, it is not discussed further within this report.

6.1.1.10 For consideration of collision risk and displacement and disturbance, the information provided in the RIAA (**Volume B2, Chapter 2: Report to Inform Appropriate Assessment**) has sought to establish, for each relevant species, the appropriate parameters to predict likely mortalities of adult seabirds connected to Hornsea Four and as apportioned to individual SPAs (including FFC SPA).

6.1.1.11 These are complex assessments with options available for a number of parameters used, such as displacement levels, mortality rates, the baseline population references, growth rate scenarios, apportionment, and the in-combination scope. The Applicant has sought to reach agreement on approach with the SNCB throughout the consultation (Evidence Plan) process, which are referenced throughout. It should be noted that the assessment made draws on a number of resources and references that were not available at the time Hornsea three was assessed. These are detailed in the RIAA (**Volume B2, Chapter 2: Report to Inform Appropriate Assessment**) but include the following key points:

- For auks and disturbance/displacement, a comprehensive review has been undertaken by APEM¹⁹ of all post-construction monitoring studies undertaken to date within the North Sea and UK Western Waters (as summarised in Table 10 3 of **Volume B2, Chapter 2: Report to Inform Appropriate Assessment**). To investigate the evidence base for the appropriate mortality rate (1-10%) and displacement rate (30-70%) to apply for Hornsea Four while ensuring precaution remains²⁰;
- Updated colony information for auks;
- Improvements to the methods to estimate collision risk in kittiwake through the use of the sCRM, developed by Marine Scotland Science (Donovan, 2018) to provide more accurate collision mortality estimates through the use of this tool deterministically. The use of the sCRM was only agreed Natural England as being suitable to use deterministically in 2020 (OFF-ORN-2.26 in **Volume B1, Annex 1.1 Evidence Plan**) following substantial testing by APEM in consultation with Natural England, the RSPB and DMPStats (the developers of the model);
- A number of OWFs submitting revised collision mortality totals following mitigation design changes (for instance from raising the air gap) following their consent decisions reducing the overall risk to kittiwakes from FFC SPA through lower mortality rates;
- The removal of Hornsea Three kittiwake mortality rate from in-combination assessments due to this being fully compensated for;

¹⁹ APEM (2021). Auk Habituation Note [In prep]

²⁰ Sources: Thanet: Percival, 2013; Westermost Rough: APEM, 2017; North Hoyle: PMSS, 2008; Robin Rigg: Vallejo et al., 2017, Zuur, 2018; Lincs: Webb et al., 2017; Prinses Amalia: Leopold et al 2013, Zuur 2018; Egmond aan Zee: Leopold et al 2013, Zuur 2018; Helgoland Cluster & Butendiek: Peschko et al., 2020; Thornton Bank: Vanermen et al., 2019; Bligh Bank: Vanermen et al., 2019; BARD 1: Braasch et al., 2015; Alpha Ventus: Welcker and Nehls, 2016; Kentish Flats: Gill et al., 2008; Gunfleet Sands: Percival, 2010; Horns Rev 1: Petersen and Fox 2007; Horns Rev 2: Petersen et al 2014.

- The introduction of population modelling through the Natural England developed Seabird PVA tool (Natural England, 2019²¹), that provides the most up to date methods to estimate potential effects at the colony level for kittiwake at the FFC SPA; and
- Additional supporting evidence on the latest FFC SPA colony growth rates of relevance to assessing the potential for an AEol (Aitken et al, 2017²²).

6.1.1.12 The decision by the Secretary of State for Hornsea Three is acknowledged in Section 1.4 of the RIAA (**Volume 2, Chapter 2: Report to Inform Appropriate Assessment**), including the justification for the re-assessment of the potential for an AEol on the kittiwake feature of the FFC SPA for Hornsea Four. [Section 1.5.4 of the RIAA also includes acknowledgement of the decision by the SoS for Norfolk Boreas which underpins the in-combination conclusion with regards the kittiwake feature of the FFC SPA for Hornsea Four.](#)

6.1.1.13 For each species, the following is available in the RIAA and associated Appendices (**Volume 2, Chapter 2: Report to Inform Appropriate Assessment**):

- Assumptions that underlie the predicted impacts;
- The full list of OWF projects considered in the in-combination assessment;
- Predicted collision or disturbance/displacement mortalities for each OWF considered;
- The method to apportion birds to breeding colonies and the FFC SPA;
- Details of the PVA methodology and 'NE PVA Tool' to assess population-level impacts from the predicted mortalities;
- Specific input parameters and interpretation of the PVA results - **Volume A5 Annex 5.4: Offshore Ornithology Population Viability Analysis**; and
- Dynamics regarding long and short-term population growth and decline.

6.2 Kittiwake

6.2.1.1 Kittiwake flight behaviour places it at risk of collision with the turning blades of offshore wind turbines. Information on collision risks to the FFC SPA kittiwake population alone and in-combination is provided within **Sections 10.4.4** and **11.4.3** of the RIAA respectively (**Volume B2, Chapter 2: Report to Inform Appropriate Assessment**)

6.2.1.2 Multiple OWF were identified for the potential to act in-combination. The in-combination collision mortality totals as apportioned to FFC SPA (presented in Table 58 of the RIAA (**Volume B2, Chapter 2: Report to Inform Appropriate Assessment**) and reproduced here in [Table 6-1](#)~~Table 6-1~~~~Table 6-1~~) for all consented projects are derived from the latest in-combination collision risk values presented at Deadline XI for EA1N / EA2²³ which are the most up to date in-combination collision tables for the FFC SPA at the time of this

²¹ <http://publications.naturalengland.org.uk/publication/4926995073073152>

²² Aitken, D., Babcock, M., Barratt, A., Clarkson, C. and Prettyman, S. (2017). Flamborough and Filey Coast pSPA Seabird Monitoring Programme – 2017 Report. RSPB Bempton Cliffs, East Riding of Yorkshire

²³ Scottish Power Renewables (2021). East Anglia Two and East Anglia One North Offshore Windfarms Deadline 11 Offshore Ornithology Cumulative and In-Combination Collision Risk and Displacement Update. [Online] Available from: <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010077/EN010077-005243-ExA.AS-3.D11.V1%20EA1N&EA2%20D11%20Offshore%20Ornithology%20Cumulative%20and%20In%20Combination%20Collision%20Risk%20and%20Displacement%20Update.pdf>

assessment. The following amendments were made to the values published at Deadline XI for EA1N / EA2 for assessments included within this report:

- Updated collision mortality values for Hornsea Four attributed to the FFC SPA as described within the RIAA ([Volume B2, Chapter 2: Report to Inform Appropriate Assessment](#));
- Removal of Beatrice Demonstrator as the project will be decommissioned by the time Hornsea Four is predicted to be operational; and
- Updated Hornsea Three values (for kittiwake following the SoS decision, see Section 1.4 of the RIAA ([Volume B2, Chapter 2: Report to Inform Appropriate Assessment](#))) and for other species the final Applicant's values as presented in Orsted, 2021²⁴.

6.2.1.3 Collision risk mortality for kittiwake as apportioned to FFC SPA is summarised in [Table 6-1](#) below (which reproduces Table 58 of the RIAA ([Volume B2, Chapter 2: Report to Inform Appropriate Assessment](#))). The contribution by Hornsea Four is highlighted in **bold** in the top row for ease of reference.

Table 6-1 Attribution of kittiwake numbers to the FFC SPA for three bio-seasons for each offshore wind farm included in the in-combination assessment

Project	Migration-free breeding	Post-breeding migration	Return Migration	Annual Total	Tier
Hornsea Four	17.3	2.1	1.8	21.2	1d
Beatrice	0.0	0.6	2.9	3.5	1a
Blyth Demonstration Site	0.0	0.1	0.1	0.2	1a
Dudgeon	-	-	-	-	1a
East Anglia One	0.0	8.7	3.4	12.0	1a
EOWDC	0.0	0.3	0.1	0.4	1a
Galloper	0.0	1.5	2.3	3.8	1a
Greater Gabbard	0.0	0.8	0.8	1.6	1a
Gunfleet Sands	-	-	-	-	1a
Hornsea Project One	36.5	3	1.5	41.0	1a
Humber Gateway	1.9	0.2	0.1	2.2	1a
Hywind 2 Demonstration	0.0	0.1	0.1	0.1	1a
Kentish Flats	0.0	0.1	0.1	0.1	1a
Kentish Flats Extension	0.0	0	0.2	0.2	1a
Kincardine	0.0	0.5	0.1	0.6	1a
Lincs, Lynn & Inner Dowsing	0.7	0.1	0.1	0.8	1a
London Array	0.0	0.1	0.1	0.3	1a
Methil	0.0	0.0	0.0	0.0	1a
Race Bank	1.9	1.3	0.4	3.6	1a

²⁴ Orsted (2021). Hornsea Three Calculation of effect estimates.

Project	Migration-free breeding	Post-breeding migration	Return Migration	Annual Total	Tier
Rampion	0.0	2	2.1	4.2	1a
Scroby Sands	-	-	-	-	1a
Sheringham Shoal	-	-	-	-	1a
Teesside	0.0	1.3	0.2	1.5	1a
Thanet	0.0	0	0	0.1	1a
Westernmost Rough	0.1	0	0	0.1	1a
Hornsea Project Two	13.3	0.5	0.2	14	1b
Moray East	0.0	0.1	1.4	1.5	1b
Neart na Gaoithe	0.0	3	0.3	3.4	1b
Seagreen Alpha & Bravo	0.0	16.9	17.8	34.7	1b
Triton Knoll	24.6	7.5	3.3	35.4	1b
Dogger Bank A & B	55.8	7.3	21.3	84.3	1c
Dogger Bank C & Sofia	26.4	4.9	15.6	46.9	1c
East Anglia Three	0.0	3.1	2.2	5.3	1c
Hornsea Three ²⁵	0.0	0.0	0.0	0.0	1c
Inch Cape	0.0	12.1	4.6	16.7	1c
Moray West	0.0	1.3	0.5	1.8	1c
East Anglia ONE North	0.0	0.4	0.3	0.7	1d
East Anglia TWO	0.0	0.3	0.5	0.8	1d
Norfolk Boreas	11.4	1.7	0.9	14	1d
Norfolk Vanguard	18.7	0.9	1.4	21.0	1d
Dudgeon Extension Project	17.2	0.5	0.2	17.9	2
Sheringham Shoal Extension Project	0.9	0.1	0.0	1.0	2
All Projects Total	226.8	83.4	86.8	396.9	

6.2.1.4 After mortality rates were estimated for each contributing OWF and apportioned to the FFC SPA, total in-combination mortality was estimated to be 396.9 adult individuals per annum (across all bio-seasons).

6.2.1.5 The RIAA ([Volume B2, Chapter 2: Report to Inform Appropriate Assessment](#)) considers the population growth rate in detail, finding that when considering the overall long-term population trend from 1969 of 30,800 pairs until the most recent accurate counts in 2017 of 51,535 pairs, the population shows a steady increase in the growth rate of 0.82% per annum (in the context of the described population fluctuations).

²⁵ See Section 1.4 of the RIAA for context (Volume 2, Annex 2: Report to Inform Appropriate Assessment)

6.2.1.6 The output of the newly developed NE PVA Tool (presented in Table 59 of the RIAA ([Volume B2, Chapter 2: Report to Inform Appropriate Assessment](#))), predicted that the in-combination collision risk to kittiwakes of the FFC SPA may cause a maximum reduction in the population growth rate by 0.48% per annum. When assessing against the long-term and most recent colony growth rates, the in-combination collision risk mortality would not negatively impact the colony growth rate to the point of causing an adverse population effect; it would only slow the rate of growth.

6.2.1.7 Therefore, as the long-term health of the FFC SPA colony of kittiwakes is steadily on the increase, the RIAA found that it is reasonable to assume that this long-term trend is the more appropriate to gauge potential impacts against and use to predict whether the effects of collision risk impacts from Hornsea Four in-combination with other offshore wind farms on the kittiwake feature of the FFC SPA.

[6.2.1.8](#) Following this evidence led approach to consider an in-combination adult mortality rate of 396.9 against the most appropriate FFC SPA kittiwake colony short and long-term growth rates, the maximum reduction in the population growth rate of 0.48% (using the density independent model) would not result in the growth rate becoming negative.

~~6.2.1.86.2.1.9 However, the Applicant has carefully reviewed the Secretary of State's HRA for Norfolk Boreas and notes that the finding that the kittiwake population would continue to grow has not been accepted by the Secretary of State as a basis to exclude AEOI/AEoI for Norfolk Boreas. Continued growth in the population of kittiwake at the FFC SPA, albeit at a reduced rate, was a factor relied upon by the Applicant to support its position that there would be no AEOI/AEoI in-combination in respect of kittiwake at the FFC SPA. However, the Secretary of State, on advice from Natural England, has reached the alternative conclusion in the context of Norfolk Boreas. The Applicant therefore considers that, on this basis an AEOI/AEoI cannot be ruled out in respect of kittiwake at the FFC SPA. The kittiwake feature of the FFC SPA would therefore remain in a favourable condition and continue to increase in population after 35 years. This would enable the conservation objective to be met, which is to maintain the qualifying populations of the FFC SPA (44,520 breeding pairs or 89,040 breeding adults²⁶) and would not prevent the target from being reached, which is to restore the size of the breeding population at a level which is above 83,700 breeding pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent, over the operational lifespan of Hornsea Four and an AEOI/AEoI from in-combination collision mortality impacts can be ruled out. This would also mean that the target to restore the kittiwake feature of the FFC SPA to the level referenced above could also still be met over a longer period of time and an AEOI/AEoI from in-combination collision mortality impacts can be ruled out.~~

6.3 Gannet

6.3.1.1 The potential for LSE was identified for gannet from FFC SPA with respect to collision risk (in operation) and disturbance/displacement (during all project phases) and the combined effect of both together. Information to support the HRA alone and in-combination is

²⁶<http://publications.naturalengland.org.uk/file/4690761199386624>

provided in Section 10.4.4 and Section 11.4.3 respectively in the RIAA ([Volume B2, Chapter 2: Report to Inform Appropriate Assessment](#)).

6.3.1.2 The assessment considers both the citation population (16,938 breeding adults, with an annual background mortality of 1,372 breeding adults) and the latest population count (26,784 breeding adults based on the 2017 counts, with an annual background mortality of 2,170²⁷) with reference to the latest mean count (24,594 adults based on the mean of the 2012, 2015 and 2017 counts²⁸). For the PVA, potential impacts were assessed against the updated 2017 population (26,784 breeding adults) as agreed with Natural England (see OFF-ORN-2.30 in [Volume B1, Annex 1.1 Evidence Plan](#)).

6.3.2 Collision Risk

6.3.2.1 Collision risk mortalities were assessed for multiple OWF sites with the potential to act in-combination, with apportionment to the FFC SPA outside the breeding season using data provided by Furness (2015)²⁹. [Table 6-2](#) below reproduces 56 from the RIAA ([Volume B2, Chapter 2: Report to Inform Appropriate Assessment](#)), with values for Hornsea Four listed first in **bold** for ease of reference.

Table 6-2 Attribution of gannet numbers to the FFC SPA for three bio-seasons for each offshore wind farm included in the in-combination assessment

Project	Migration-free breeding	Post-breeding migration	Return migration	Annual total	Tier
Hornsea Four	8.2	0.2	0.1	8.5	1d
Beatrice	0.0	2.3	0.6	2.9	1a
Blyth Demonstration Site	0.0	0.1	0.2	0.3	1a
Dudgeon	22.3	1.9	1.2	25.3	1a
East Anglia One	3.4	6.3	0.4	10.1	1a
EOWDC	0.0	0.3	0.0	0.3	1a
Galloper	0.0	1.5	0.8	2.3	1a
Greater Gabbard	0.0	0.4	0.3	0.7	1a
Gunfleet Sands	-	-	-	-	1a
Hornsea Project One	11.5	1.5	1.4	14.4	1a
Humber Gateway	1.9	0.1	0.1	2.0	1a
Hywind 2 Demonstration	0.0	0.0	0.1	0.1	1a
Kentish Flats	0.0	0.0	0.1	0.1	1a
Kentish Flats Extension	-	-	-	-	1a
Kincardine	0.0	0.0	0.0	0.0	1a

²⁷ Aitken, D., Babcock, M., Barratt, A., Clarkson, C. and Prettyman, S. (2017). Flamborough and Filey Coast pSPA Seabird Monitoring Programme – 2017 Report. RSPB Bempton Cliffs, East Riding of Yorkshire

²⁸ Aitken, D., Babcock, M., Barratt, A., Clarkson, C. and Prettyman, S. (2017). Flamborough and Filey Coast pSPA Seabird Monitoring Programme – 2017 Report. RSPB Bempton Cliffs, East Riding of Yorkshire

²⁹ See [Section 10.4.4.8](#) of the RIAA ([Volume 2, Annex 2: Report to Inform Appropriate Assessment](#)) for details on the derivation of displacement and mortality [Section 10.4.4.8](#) of the RIAA ([Volume 2, Annex 2: Report to Inform Appropriate Assessment](#))

Project	Migration-free breeding	Post-breeding migration	Return migration	Annual total	Tier
Lincs, Lynn & Inner Dowsing	2.3	0.07	0.1	2.5	1a
London Array	0.0	0.07	0.1	0.2	1a
Methil	0.0	0.0	0.0	0.0	1a
Race Bank	33.7	0.6	0.3	34.5	1a
Rampion	0.0	3.1	0.1	3.2	1a
Scroby Sands	-	-	-	-	1a
Sheringham Shoal	14.1	0.2	0.0	14.3	1a
Teesside	2.4	0.1	0.0	2.5	1a
Thanet	0.0	0.0	0.0	0.0	1a
Westermost Rough	0.2	0.0	0.0	0.2	1a
Hornsea Project Two	7	0.7	0.4	8.0	1b
Moray East	0.0	1.7	0.6	2.3	1b
Neart na Gaoithe	0.0	2.3	1.4	3.7	1b
Seagreen Alpha & Bravo	0.0	2.4	4.1	6.4	1b
Triton Knoll	26.8	3.1	1.9	31.7	1b
Dogger Bank A & B	40.6	4.0	3.4	47.9	1c
Dogger Bank C & Sofia	7.4	0.5	0.7	8.5	1c
East Anglia Three	4.8	1.4	0.5	6.7	1c
Hornsea Three	1.0	0.0	0.0	1.0	1c
Inch Cape	0.0	1.4	0.3	1.7	1c
Moray West	0.0	0.1	0.1	0.2	1c
East Anglia ONE North	12.4	0.5	0.1	13.0	1d
East Anglia TWO	12.5	1.1	0.2	13.8	1d
Norfolk Boreas	14.2	0.6	0.2	15.1	1d
Norfolk Vanguard	8.2	0.9	0.3	9.4	1d
Dudgeon Extension Project	3.6	0.2	0.0	3.9	2
Sheringham Shoal Extension Project	0.3	0.1	0.0	0.4	2
All Projects Total	238.8	39.6	19.9	298.1	

6.3.2.2 A PVA using the 'NE Seabird PVA Tool' was used to determine the impact of the estimated mortalities on the FFC SPA population. A worst-case in-combination estimate of 298.1 adult breeding birds per annum was predicted, associated with a 1.36% reduction in the population growth rate. The RIAA ([Volume B2, Chapter 2: Report to Inform Appropriate Assessment](#)) reviewed colony growth rates for gannet at FFC over the last 50 years, with an average growth rate of 14% over the last 50 years and 8% for the last 20 years. With respect to future plausible growth rates, the RIAA also referenced advice provided by Natural

England to Norfolk Boreas³⁰ (Natural England, 2020) in relation to the gannet feature of the FFC SPA, suggesting they believe that a range of plausible future growth rate scenarios between 1% to 5% should be considered, based on a review of current gannet colony growth at 22 differing colonies across Britain, the Channel Islands and Ireland. Further, NE considered that it would be highly unlikely for the gannet growth rate at FFC SPA to be as low as 1% and would be expected to do better than 1.3%. The resilience of gannet populations is further evidenced by the growth rate at Sula Sgeir, a colony of equivalent size and with an annual growth rate of 2.2% despite up to 2,000 chicks being harvested annually, with modelling showing a harvest up to 3,500 annually would not affect the population.

- 6.3.2.3 When considering Natural England's conservative suggestion that they believe the annual colony growth rate to be higher than 1.3% over the next 30 years, and in the context of the current colony growth rates and growth rates experienced elsewhere (including at Sula Sgeir) the in-combination collision risk mortality would not cause the growth rate to become negative. This means the conservation objective of the gannet feature of the FFC SPA, to maintain the size of the breeding population, with a target for this to be at a level which is above 8,469 pairs (the citation population), whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent, would still be met over the operational lifespan of Hornsea Four and an AEol from in-combination collision mortality impacts can be ruled out.

Disturbance and Displacement

- 6.3.2.4 To assess the potential for an in-combination effect to result from disturbance and displacement for gannet, the assessment in the RIAA ([Volume B2, Chapter 2: Report to Inform Appropriate Assessment](#)) focused on the operation and maintenance phase. First, Table 40 in the RIAA summarises the gannet abundance to be applied in the in-combination assessment for individual projects. To these total abundance numbers, a range of displacement and mortality values are applied, including a displacement rate of between 60% and 80% (accepted by Natural England as appropriate rates for assessment purposes (OFF-ORN-2.43 in [Volume B1, Annex 1.1 Evidence Plan](#))) with a consequent mortality rate of 1% (based on expert judgement supported by additional evidence that suggests that gannet have a large mean max (315 km) and maximum (709 km) foraging range (Woodward et al. 2019³¹) and feed on a variety of different prey items that provide sufficient alternative foraging opportunities). That information is presented in full the RIAA in Table 41.
- 6.3.2.5 Based on the agreed displacement rate of 60-80% and the mortality rate of 1%, the in-combination number predicted to be displaced from the OWFs assessed, including Hornsea Four, has a predicted consequent mortality of between 51 (50.75) and 68 (67.66) breeding adults across all bio-seasons per annum, with a corresponding predicted consequent baseline mortality estimated at between 3.70% and 4.93% across all bio-seasons per annum (Hornsea Four alone contributes an increase of three to four predicted breeding adult mortalities equating to an increase of 0.24% to 0.31% in baseline mortality per annum

³⁰ Natural England (2020). Natural England's comments in relation to the Norfolk Boreas updated ornithological assessment, submitted at Deadline 2 [REP2-035]. PINS Ref REP4-040.

³¹ Woodward, I. et al. (2019) Desk-based revision of seabird foraging ranges used for HRA screening. BTO research report number 724. Thetford.

across all bio-seasons). For the more recent 2017 colony count, the increase on baseline mortality is estimated at between 2.34% and 3.12% across all bio-seasons per annum (Hornsea Four alone contributes an increase of 0.15% to 0.20% in baseline mortality per annum across all bio-seasons).

- 6.3.2.6 The subsequent PVA has been assessed against the latest 2017 colony count population size of 26,784 breeding adults as agreed with Natural England (OFF-ORN-2.30 in [Volume B1, Annex 1.1 Evidence Plan](#)), with a predicted in-combination reduction in growth rate (Table 42 of the RIAA) of 0.22% (for a displacement of 60% and mortality of 1%) to 0.30% (for a displacement of 80% and mortality of 1%). These values are discussed in light of historic and predicted future colony growth rates in the RIAA (and as summarised above in [paragraph 6.3.2.2](#)); even if the conservative growth rate predictions of Natural England (of greater than 1.3% in a range up to 5%) were applied such a potential reduction in colony growth rate would not cause the growth rate to become negative.
- 6.3.2.7 This means the conservation objective of the gannet feature of the FFC SPA (which is to maintain the population of qualifying species, with the target for gannet being to maintain the size of the breeding population at a level which is above the citation population of 8,469 pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent), would still be met over the operational lifespan of Hornsea Four and an AEol from in-combination displacement mortality impacts can be ruled out.

Combined effect: collision and displacement in-combination

- 6.3.2.8 As noted above, the RIAA ([Volume B2, Chapter 2: Report to Inform Appropriate Assessment](#)) concluded no AEol with respect to both collision risk and disturbance/displacement of gannet in-combination at the FFC SPA. The combined impacts have been assessed against the latest 2017 colony count population size of 26,784 breeding adults as agreed with Natural England (OFF-ORN-2.30 in [Volume B1, Annex 1.1 Evidence Plan](#)), with further details of the PVA methodology and input parameters used for the analysis found in Appendix H of the RIAA. It is acknowledged that the combined impact of both collision risk and disturbance/displacement will be greater than either one acting alone, however it is also true that simply adding the values together would be precautionary as an individual bird cannot be both displaced and at risk of collision. Further consideration of both impacts acting together is therefore required. The results of the PVA analysis are provided below in [Table 6-3Table 6-3Table 6-3](#).

Table 6-3:Population modelling results using the NE Seabird PVA Tool for potential gannet collision and displacement mortality rate for Hornsea Four in-combination with all other projects attributed to the FFC SPA.

Scenario	Adult mortality (per annum)	Density-independent counterfactual of population growth (after 35 years)	Reduction in growth rate (per annum)
In-combination total using 60% Displacement, 1% Mortality and CRM	349	0.985	1.54%

In-combination total using 80% Displacement, 1% Mortality and CRM	366	0.984	1.61%
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6.3.2.9 The PVA for combined collision and displacement impacts from Hornsea Four and all other projects in-combination predicted between 349 and 366 adult mortalities could occur, representing a maximum reduction in the population growth rate of between 1.54 and 1.61% (see ~~Table 6-3~~~~Table 6-3~~~~Table 6-3~~ above). Over the last 50 years, the gannet population has grown annually by just over 14%, with that rate calculated as 8% on average over the last 20 years. On its current trajectory, it is therefore likely that the population will continue to grow, albeit at a potentially lower rate due to competition for nesting ledges and prey resource. With respect to plausible growth rates, as noted above and referenced in the RIAA ([Volume B2, Chapter 2: Report to Inform Appropriate Assessment](#)), Natural England provided advice on this to Norfolk Boreas, suggesting a range of future growth rates of between 1 and 5%. Although NE considered that the FFC SPA colony was unlikely to grow in excess of 4.5% annually, a growth of 1% was also considered highly unlikely, and a rate in excess of 1.3% predicted. Given the resilience of the Sula Sgeir gannet colony (a colony of equivalent size to the FFC SPA) to harvesting of 2,000 chicks per year (still maintaining a growth rate of 2.2% per annum and predicted to remain positive even if chick harvest was up to 3,500 per year), there is strong evidence for a growth rate towards the upper end of the Natural England predicted range.

6.3.2.10 When considering Natural England’s conservative suggestion that they believe the annual colony growth rate to be higher than 1.3% over the next 30 years, the in-combination collision and displacement mortality ~~would~~will not cause the growth rate to become negative if it remains above 1.61% and when assessed against the colonies current annual growth rates a maximum reduction of 1.61% per annum would not cause the colony to fall below either the citation population or the latest mean count. However, a reduction in growth rate to this extent is highly improbable due to the simplistic method of adding these two impacts together which almost certainly leads to inflation of impacts (a bird which is displaced can’t collide with a turbine and vice versa) and, as suggested from data at a colony of similar size at Sula Sgeir, where this species has demonstrated it can withstand harvesting at rates of 2,000 chicks per annum from the population on a regular basis without it significantly affecting the colony size or growth rate. This means the conservation objective of the gannet feature of the FFC SPA (which is to maintain the population of qualifying species, with the target for gannet being at a level which is above 8,469 breeding pairs (16,938 breeding adults), whilst avoiding deterioration from its current level as indicated by the latest mean peak count), would still be met over the operational lifespan of Hornsea Four and an AEol from in-combination collision and displacement combined impacts can be ruled out.

6.4 Guillemot

6.4.1.1 Guillemot is sensitive to the presence of OWF turbines and activities that take place within the arrays of OWF. The RIAA ([Volume B2, Chapter 2: Report to Inform Appropriate Assessment](#)) therefore provides information to enable an assessment of the potential risk to the guillemot population of FFC SPA from disturbance/displacement resulting from Hornsea Four in-combination with other OWF. The assessment in-combination (including details on

the PVA analysis) is presented in [Section 11.4.3](#) and Appendix H of the RIAA ([Volume B2, Chapter 2: Report to Inform Appropriate Assessment](#)).

- 6.4.1.2 The assessment of impact on guillemot from displacement/disturbance typically applies a number of parameters, with a range applied in the RIAA for displacement (30-70%) and mortality (1–10%, based on expert opinion (Natural England, 2014³²), although Natural England acknowledge that the use of displacement mortality rates from the upper end of the range are not likely (OFF-ORN-2.50 in [Volume B1, Annex 1.1 Evidence Plan](#)), particularly when considering that many of the offshore wind farms are not considered to be in important areas for guillemot from the FFC SPA. In addition, the assessment also explored the evidence base for these values and provided justification for the use of a 50% displacement and 1% mortality for Hornsea Four, with context on the remaining precaution inherent in these values. A summary of that evidence base is provided below.
- 6.4.1.3 In relation to displacement, the RIAA ([Volume B2, Annex 2: Report to Inform Appropriate Assessment](#)) explored the evidence underpinning the existing range together with more recent data collected from 20 different European OWF, including post construction monitoring studies that re-analysed existing datasets. A significant variation is apparent between the studies, ranging from attraction (one OWF) to no significant effect (seven studies being none or weak displacement), to displacement (three inferred but not statistically tested and eight with negative displacement). Overall, the review found that there is significant justification for the use of a 50% displacement rate for in-combination assessments as an upper limit, which is still considered as precautionary as this level of displacement is also applied to the 2 km buffer for all offshore wind farms.
- 6.4.1.4 For consequent mortality, the RIAA noted that the evidence base for the appropriateness of the 10% upper limit is unclear. However, since Natural England's interim advice on auk mortality rates was issued and updated in 2017 (SNCBs, 2017³³) there have been detailed studies, as summarised in the RIAA, with updates to predict the fate or population consequence of displaced seabirds, including auks, from OWFs (Searle et al., 2014³⁴ and 2018³⁵, and van Kooten et al., 2019³⁶), and an additional study with anecdotal evidence of implied low additional mortality rates from auk colony stability on Helgoland, where OWFs have been operating in the area since 2014 (Peschko et al., 2020³⁷). Of these, the Van Kooten et al., (2019) study demonstrated that an additional 1% mortality would still be precautionary (based on a non-breeding season mortality rate for displaced auks of 0.1 - 0.4%), while Searle et al., (2014) provided evidence that changes in time and energy budgets, in relation to guillemot and razorbill, as a result of displacement from OWFs would, even at

³² Natural England, 2014. Written Representations of Natural England. Hornsea Offshore Wind Farm — Project One Application. Planning Inspectorate Reference: EN010033 Available at: <http://infrastructure.planningportal.gov.uk/wp-content/ipc/uploads/projects/EN010033/2.%20Post-Submission/Representations/Written%20Representations/Natural%20England.pdf>.

³³ Statutory Nature Conservation Bodies. (2017). Advice on how to present assessment information on the extent and potential consequences of seabird displacement from Offshore Wind Farm (OWF) developments.

³⁴ Searle, K., Mobbs, D., Butler, A., Bogdanova, M., Freeman, S., Wanless, S. and Daunt, F. (2014). Population consequences of displacement from proposed offshore wind energy developments for seabirds breeding at Scottish SPAs (CR/2012/03). CEH Report to Marine Scotland Science.

³⁵ Searle, K. R., Mobbs, D.C., Butler, A., Furness, R.W., Trinder, M.N. and Daunt, F. (2018). Finding out the Fate of Displaced Birds. Scottish Marine and Freshwater Science Vol 9 No 8, 149pp.

³⁶ Van Kooten, T., Soudijn, F., Tulp, I., Chen, C., Benden, D., & Leopold, M. (2019). The consequences of seabird habitat loss from offshore wind turbines, version 2: Displacement and population level effects in 5 selected species (No. C063/19). Wageningen Marine Research.

³⁷ Peschko, V., Mendel, B., Mueller, S., Markones, N., Mercker, M. and Garthe, S. (2020). Effects of offshore windfarms on seabird abundance: Strong effects in spring and in the breeding season. Marine Environmental Research. 162.

their highest impacts, be unlikely to exceed an additional 0.5% in mortality. Overall, the studies together provide the most comprehensive review of potential displacement consequences to auks during the breeding and non-breeding season, all collectively concluding that any displacement effects, even when considering overly precautionary rates to increase potential impacts, are unlikely to exceed a mortality rate of 0.5%. Therefore, they support the use of a 1% mortality rate to offer an appropriate level of precaution that encompasses scenarios considering the highest impacts on demographics from displacement.

6.4.1.5 Information on multiple OWF in the wider UK North Sea and English Channel BDMPs has been compiled, providing guillemot displacement values as apportioned to FFC SPA and consequent mortality to be assessed. The displacement totals per OWF are provided in [Table 6-4](#) ~~Table 6-4~~ ~~Table 6-4~~, with Hornsea Four given first in **bold** for ease of reference.

Table 6-4 In-combination displacement totals for guillemot attributed to the FFC SPA

Project	Breeding	Non-breeding	Annual Total	Tier
Hornsea Four	4,773	2,238	7,011	1d
Beatrice	0	121	121	1a
Blyth Demonstration Site	0	58	58	1a
Dudgeon	0	24	24	1a
East Anglia One	0	28	28	1a
EOWDC	0	10	10	1a
Galloper	0	26	26	1a
Greater Gabbard	0	24	24	1a
Gunfleet Sands	0	16	16	1a
Hornsea Project One	4,554	356	4,910	1a
Humber Gateway	99	6	105	1a
Hywind 2 Demonstration	0	94	94	1a
Kentish Flats	0	0	0	1a
Kentish Flats Extension	0	0	0	1a
Kincardine	0	0	0	1a
Lincs, Lynn & Inner Dowsing	0	36	36	1a
London Array	0	17	17	1a
Methil	0	0	0	1a
Race Bank	0	31	31	1a
Rampion	0	684	684	1a
Scroby Sands	-	-	-	1a
Sheringham Shoal	0	32	32	1a
Teesside	267	40	307	1a
Thanet	0	6	6	1a
Westermost Rough	347	21	368	1a
Hornsea Project Two	3,581	579	4,161	1b
Moray East	0	24	24	1b

Project	Breeding	Non-breeding	Annual Total	Tier
Neart na Gaoithe	0	166	166	1b
Seagreen Alpha	0	206	206	1b
Seagreen Bravo	0	181	181	1b
Triton Knoll	425	33	458	1b
Dogger Bank A	1,893	270	2,163	1c
Dogger Bank B	3,318	467	3,785	1c
Dogger Bank C	1,149	100	1,249	1c
East Anglia Three	0	126	126	1c
Hornsea Three	8,502	782	9,284	1c
Inch Cape	0	140	140	1c
Moray West	0	1,680	1,680	1c
Sofia	1,824	163	1,987	1c
East Anglia ONE North	0	83	83	1d
East Anglia TWO	0	74	74	1d
Norfolk Boreas	0	606	606	1d
Norfolk Vanguard	0	210	210	1d
Dudgeon Extension Project	0	355	355	2
Sheringham Shoal Extension Project	0	27	27	2
All Projects Total	30,731	10,139	40,870	

6.4.1.6 Based on a precautionary 50% displacement and 1% mortality, the number of guillemots predicted to be displaced from Hornsea Four in-combination with other offshore wind farms results in a prediction of consequent mortality of 204 (204.35) breeding adult birds across all bio-seasons per annum. The addition of 204 predicted mortalities increases the baseline mortality of the citation population or the 2017 colony count by 4.03% or 2.75% across all bio-seasons per annum respectively (Hornsea Four alone contributes an increase of 35 predicted breeding adult mortalities equating to an increase of 0.69% or 0.47% in baseline mortality across all bio-seasons per annum). The full range of displacement and consequent mortality values (for the 30-70% displacement and 1-10% mortality) is provided in the RIAA in Table 45.

6.4.1.7 PVA using the NE Seabird PVA Tool has been undertaken to determine the effect of the estimated mortalities on the FFC SPA (see Appendix H of [Volume B2, Chapter 2: Report to Inform Appropriate Assessment](#)). Displacement was assessed within the array areas and a 2 km buffer for all bio-seasons. The potential in-combination impacts have been assessed against the latest 2017 colony count population size of 121,754 breeding adults as agreed with Natural England (OFF-ORN-2.30 in [Volume B1, Annex 1.1 Evidence Plan](#)). The results from the PVA are summarised in [Table 6-5](#) ~~Table 6-5~~ ~~Table 6-5~~ below, which draws on Table 46 of the RIAA.

Table 6-5 Population modelling results using the Natural England Seabird PVA Tool for potential guillemot displacement mortality rate for Hornsea Four in-combination with all other projects attributed to the FFC SPA

Scenario	Adult mortality (per annum)	Density-independent counterfactual of population growth rate (after 35 years)	Reduction in growth rate (per annum)
30% disp, 1% Mort	123	0.999	0.11%
50% disp, 1% Mort	204	0.998	0.19%
70% disp, 1% Mort	286	0.997	0.26%
30% disp, 2% Mort	245	0.998	0.23%
50% disp, 2% Mort	409	0.996	0.38%
70% disp, 2% Mort	572	0.995	0.53%
30% disp, 5% Mort	613	0.994	0.56%
50% disp, 5% Mort	1,022	0.991	0.94%
70% disp, 5% Mort	1,430	0.987	1.31%
30% disp, 10% Mort	1,226	0.989	1.13%
50% disp, 10% Mort	2,044	0.981	1.88%
70% disp, 10% Mort	2,861	0.974	2.63%

6.4.1.8 Table 47 of the RIAA presents four annual colony compound growth rates across different timeframes between 1969 and 2017. All are positive and fall between 3.23% and 4.05%, with an average of 4% per annum across a 50-year period and over 3% for the last 20 years. Although it is impossible to know exactly how the colony will grow over the next 35 years, the current growth rates suggest the colony is still likely to grow even under all the scenarios presented in [Table 6-5](#)~~Table 6-5~~~~Table 6-5~~. There is, therefore, no potential for an AEol to the conservation objectives of the guillemot feature of FFC SPA (which is to maintain the population of qualifying species, with the target for guillemot being at a level which is above 41,607 breeding pairs (83,214 breeding adults), whilst avoiding deterioration from its current level as indicated by the latest mean peak count) in relation to disturbance and displacement effects from Hornsea Four in-combination and therefore, subject to natural change, guillemot will be maintained as a feature in the long term.

6.5 Razorbill

6.5.1.1 Razorbill is sensitive to the presence of OWF turbines and activities that take place within the arrays of OWF. The RIAA ([Volume B2, Chapter 2: Report to Inform Appropriate Assessment](#)) therefore provides information to enable an assessment of the potential risk to the razorbill population of FFC SPA from disturbance/displacement resulting from Hornsea Four in-combination with other OWF. The assessment in-combination (including details on the PVA analysis) is provided in [Section 11.4.3 and Appendix H](#) of the RIAA ([Volume B2, Chapter 2: Report to Inform Appropriate Assessment](#)).

6.5.1.2 The assessment of impact on razorbill from displacement/disturbance typically applies a number of parameters, with a range applied in the RIAA for displacement (30-70%) and mortality (1-10%, based on expert opinion (Natural England, 2014), although Natural

England acknowledge that the use of displacement mortality rates from the upper end of the range are not likely (OFF-ORN-2.50 in [Volume B1, Annex 1.1 Evidence Plan](#)). The assessment also explored the evidence base for these values and provided justification for the use of a 50% displacement and 1% mortality for Hornsea Four, with context on the remaining precaution inherent in these values. A summary is provided above in [paragraphs 6.4.1.3 and 6.4.1.4](#) as the information applies equally to guillemot and razorbill.

6.5.1.3 Information on multiple OWF in the wider UK North Sea and English Channel BDMPS has been compiled, providing razorbill displacement values as apportioned to FFC SPA and consequent mortality to be assessed. The displacement totals per OWF are provided in [Table 6-6](#) ~~Table 6-6~~ ~~Table 6-6~~, with Hornsea Four given first in **bold** for ease of reference.

Table 6-6 In-combination displacement totals for razorbill attributed to the FFC SPA

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual total	Tier
Hornsea Four	154	121	13	13	301	1d
Beatrice	0	28	15	28	72	1a
Blyth Demonstration Site	0	3	2	3	8	1a
Dudgeon	0	12	20	12	44	1a
East Anglia One	0	1	4	11	17	1a
EOWDC	0	2	0	1	3	1a
Galloper	0	2	3	13	18	1a
Greater Gabbard	0	0	11	3	13	1a
Gunfleet Sands	0	0	1	0	1	1a
Hornsea Project One	535	164	41	61	800	1a
Humber Gateway	0	1	0	1	2	1a
Hywind 2 Demonstration	0	24	0		25	1a
Kentish Flats Extension	-	-	-	-	-	1a
Kentish Flats I	-	-	-	-	-	1a
Kincardine	0	0	0	0	0	1a
Lincs, Lynn & Inner Dowsing	0	1	1	1	3	1a
London Array	0	1	0	1	2	1a
Methil	0	0	0	0	0	1a
Race Bank	0	1	1	1	4	1a
Rampion	0	2	34	113	149	1a

Project	Migration-free breeding	Post-breeding migration	Migration-free winter	Return migration	Annual total	Tier
Scroby Sands	-	-	-	-	-	1a
Sheringham Shoal	0	46	6	1	52	1a
Teesside	0	2	0	1	3	1a
Thanet	0	0	0	1	1	1a
Westermost Rough	91	4	4	3	102	1a
Hornsea Project Two	1,210	144	19	57	1,430	1b
Moray East	0	38	1	6	44	1b
Neart na Gaoithe	0	187	14	-	200	1b
Seagreen Alpha	0	0	30	-	30	1b
Seagreen Bravo	0	0	34	-	34	1b
Triton Knoll	0	9	23	4	36	1b
Dogger Bank A	375	54	47	141	616	1c
Dogger Bank B	461	71	58	174	765	1c
Dogger Bank C	250	11	26	65	352	1c
East Anglia Three	0	38	41	52	130	1c
Hornsea Three	516	69	99	72	756	1c
Inch Cape	0	98	18	-	115	1c
Moray West	0	121	5	122	247	1c
Sofia	346	20	39	100	505	1c
East Anglia ONE North	0	3	2	7	11	1d
East Anglia TWO	0	2	4	8	13	1d
Norfolk Boreas	0	9	29	12	49	1d
Norfolk Vanguard	0	30	23	31	84	1d
Dudgeon Extension Project	0	124	19	9	153	2
Sheringham Shoal Extension Project	0	22	16	5	43	2
All Projects Total	3,938	1,461	700	1,133	7,232	

6.5.1.4 Based on a precautionary 50% displacement and 1% mortality, the number of razorbill predicted to be displaced from Hornsea Four in-combination with other offshore wind farms results in a prediction of consequent mortality of 36 (36.16) breeding adult birds across all bio-seasons per annum. The addition of 36 predicted mortalities increases the baseline mortality of the citation population or the 2017 colony count by 1.63% or 0.85% across all bio-seasons per annum respectively (Hornsea Four alone contributes an increase of less than

two predicted breeding adult mortalities equating to an increase of 0.07% or 0.04% in baseline mortality across all bio-seasons per annum). The full range of displacement and consequent mortality values (for the 30-70% displacement and 1-10% mortality) is provided in the RIAA in Table 49.

6.5.1.5 PVA using the NE Seabird PVA Tool has been undertaken to determine the effect of the estimated mortalities on the FFC SPA (see Appendix H of [Volume B2, Chapter 2: Report to Inform Appropriate Assessment](#)). Displacement was assessed within the array areas and a 2 km buffer for all bio-seasons. The potential in-combination impacts have been assessed against the latest 2017 colony count population size of 40,506 breeding adults as agreed with Natural England (OFF-ORN-2.30 in [Volume B1, Annex 1.1 Evidence Plan](#)). The results from the PVA are summarised in [Table 6-7](#) below, which draws on Table 50 of the RIAA.

Table 6-7 Population modelling results using the Natural England Seabird PVA Tool for potential razorbill displacement mortality rate for Hornsea Four in-combination with all other projects attributed to the FFC SPA

Scenario	Adult mortality (per annum)	Density-Independent counterfactual of population growth rate (after 35 years)	Reduction in growth rate (per annum)
30% disp, 1% Mort	22	0.999	0.06%
50% disp, 1% Mort	36	0.999	0.11%
70% disp, 1% Mort	51	0.999	0.15%
30% disp, 2% Mort	43	0.999	0.13%
50% disp, 2% Mort	72	0.998	0.21%
70% disp, 2% Mort	101	0.997	0.30%
30% disp, 5% Mort	108	0.997	0.32%
50% disp, 5% Mort	181	0.995	0.53%
70% disp, 5% Mort	253	0.993	0.74%
30% disp, 10% Mort	217	0.994	0.63%
50% disp, 10% Mort	362	0.989	1.05%
70% disp, 10% Mort	506	0.985	1.48%

6.5.1.6 Table 51 of the RIAA presents four annual colony compound growth rates across different timeframes between 1969 and 2017. All are positive and fall between 4.40% and 7.28%, with an average of just under 6% per annum across a 50-year period and over 7% for the last 20 years. Although it is impossible to know exactly how the colony will grow over the next 35 years, the current growth rates suggest the colony is still likely to grow even under all the scenarios presented in [Table 6-7](#). There is, therefore, no potential for an AEol to the conservation objectives of the razorbill feature of FFC SPA (which is to maintain the population of qualifying species, with the target for razorbill being at a level which is above 10,570 breeding pairs (21,140 breeding adults), whilst avoiding deterioration from its current level as indicated by the latest mean peak count) in relation to disturbance

and displacement effects from Hornsea Four in-combination and therefore, subject to natural change, guillemot will be maintained as a feature in the long term.

7 Summary of Part 1 Background Information

7.1.1.1 **Part 1** of the Hornsea Four without prejudice derogation case has set out the legal and regulatory matrix required to apply the HRA Derogation Provisions should that be considered necessary by the SoS.

7.1.1.2 Evidence is presented within the Application and summarised for the reasonable worst-case potential impact for the relevant features of the FFC SPA. The Applicant considers that the resultant worst-case impacts are of insufficient magnitude to lead to an AEoI on the [gannet, razorbill and guillemot features of FFC SPA](#). ~~However, on the basis as set out in paragraph 1.2.1.57 an adverse AEoI~~ [AEoI in respect of the kittiwake feature cannot be ruled out](#).

7.1.1.3 Should the SoS conclude otherwise [in respect of gannet, razorbill or guillemot features](#), it is considered that any AEoI finding in respect of any of the relevant European sites would be marginal, based upon highly precautionary assumptions. This is relevant to **Parts 2** and **3** below which demonstrate in detail how the requirements of the HRA Derogation Provisions can readily and clearly be met, in the marginal circumstances of Hornsea Four.

Part 2: No Alternative Solutions Report to Demonstrate No Alternatives Solutions

8 Introduction to the Assessment of Alternatives

- 8.1.1.1 **Part 2** (this part) of the without prejudice derogation case examines whether there are any feasible alternative solutions to Hornsea Four. It is demonstrated with evidence to the Secretary of State (**SoS**) that there are no alternative solutions which meet Hornsea Four’s objectives.
- 8.1.1.2 A large range of alternatives have been identified, considered, and discounted. These range from ‘doing nothing’, to alternative sites, routes, designs, scales and working methods.
- 8.1.1.3 The Applicant has adopted the five principal steps set out in ~~Table 8-1~~~~Table 8-1~~~~Table 8-1~~ which consider the potential alternative solutions in a structured and sequential process:

Table 8-1 Sequential Approach to Consideration of Alternatives.

Step	Detail	Report Section
Step 1	Identify the need and core project objectives for Hornsea Four	Section 10
Step 2	Identify relevant works & potential residual harm to European sites	Section 11
Step 3	Consideration of alternatives	Section 12
Step 4	Assess and compare impact of any feasible alternative solutions on the National Site Network ³⁸	Section 13

9 Approach to Alternative Solutions

- 9.1.1.1 The legal context and Habitats Regulations Assessment (HRA) process surrounding the application of Article 6 (4) is set out in **Part 1** of the derogation information (see **Section 3**). The Habitats Regulations do not define "alternative solutions"³⁹ and there is limited case law at United Kingdom (UK) or European Union (EU) level.
- 9.1.1.2 In the absence of a prescriptive statutory framework or case law, the approach adopted by the Applicant has been developed drawing upon relevant European Commission (EC) opinions⁴⁰. UK and EC guidance (principally European Commission, 2018, DEFRA 2012⁴¹ and MN 2000⁴²) and UK planning decisions, including the Able Marine Energy Park (AMEP) and the recent Decision (31 December 2020) on Orsted Hornsea Project (UK) Three (Hornsea Three)⁴³. DEFRA 2021b does not make explicit comment on the approach to the assessment of alternatives. It is acknowledged that such opinions, guidance, and planning precedent while useful, are not binding on the SoS.
- 9.1.1.3 EC Guidance (2018) directs that subsequent to the consideration of project need, alternatives should be analysed with regard to their relative performance and with reference to the site’s “conservation objectives, integrity and contribution to the overall

³⁸ Regulations 4 and 33, EU Exit Regulations stipulate that the "Natura 2000" must now be read and construed as references to the coherence of the "National Site Network".

³⁹ The phrase is also not defined in the Habitats Directive.

⁴⁰ EC opinions may be persuasive but do not constitute binding EU judgements.

⁴¹ Habitats Directive: guidance on the application of article 6(4), published by DEFRA in December 2012

⁴² Managing Natura 2000 Sites - The provisions of Article 6(3) of the 'Habitats' Directive 92/43/EEC (2000), published by the EC in 2000, as updated in November 2018.

⁴³ Department for Business, Energy & Industrial Strategy – Letter from the SoS to Orsted (the Applicant) dated 31 December 2020 regarding the application for Hornsea Project Three (UK) Limited. See [link](#).

coherence of the Natura 2000 network [National Site Network], taking also into account their proportionality in terms of cost." This guidance provides the basic structure of the proposed approach.

9.1.1.4 In determining Hornsea Three ⁴⁴, the SoS set out the benefits from the development to UK society that would need to be provided by any project that might constitute an alternative. The fundamental objectives (para 6.30) were:

- To generate low carbon electricity from an offshore wind farm in support of the decarbonisation of the UK electricity supply;
- To export electricity to the UK National Grid to support UK commitments for offshore wind generation and security of supply;
- To optimise generation and export capacity within the constraints of available sites and onshore transmission infrastructure; and
- To deliver a significant volume of offshore wind in the 2020s.

9.1.1.5 Further, and in accordance with guidance published by DEFRA, the SoS did not consider the development of alternative forms of energy generation to meet the objectives for the Development. The SoS was of the view that the Applicant had considered all alternative means of fulfilling these objectives (paragraph 6.33) and that the consideration of alternatives in terms of design flexibility had been fully explored in accordance with National Policy Statements EN-1 and EN-3 (paragraph 7.1). Using the reasons set out in the HRA for Hornsea Three, the SoS concluded that no alternative solutions are available. The principles set out for the Hornsea Three HRA are equally applicable to Hornsea Four and are reiterated here.

9.1.1.6 In summary, the Applicant has distilled the following key principles that are considered to apply when considering whether it is necessary to resort to an alternative solution, which have in turn informed the approach adopted by the Applicant (outlined in [Table 11-1](#) above):

- The consideration of alternatives can be approached as a multi-staged or stepped process.
- The first step is to identify the relevant objective(s) which any alternative would need to address. That requires an understanding of the need the project is designed to address (e.g., as described in Government policy) and the consequences of doing nothing and the project aims and critical parameters that define project performance, or feasibility.
- The project objective(s) that frame the search for alternatives can legitimately be narrow in scope, provided they are genuine and important.
- Conversely, the notion of alternatives cannot reasonably be cast so wide by reference to an abstract "aim" or "problem", so as to include any and every possible alternative strategy. It is in the context of a given project that the alternatives question arises.
- The need and project objective(s) identified as set out in [Section 10](#) frame the consideration of any alternatives – options which do not address the need and/or fail to meet the objective(s) are not an "alternative solution".

⁴⁴ Department for Business, Energy & Industrial Strategy – Letter from the SoS to Orsted (the Applicant) dated 31 December 2020 regarding the application for Hornsea Project Three (UK) Limited. See [link](#).

- The "do nothing" option should be considered but will not be an alternative solution (unless the need and project objectives can be delivered by doing nothing).
- It is not necessary to consider every theoretically imaginable alternative. The SoS is entitled to discount alternatives that are obviously out of the question or improbable without the need for detailed assessment.
- The detailed consideration of alternatives should be limited to options which are demonstrably feasible: financially, legally, and technically⁴⁵.
- Consideration of cost and viability is a relevant and legitimate consideration in determining feasibility. Alternative solutions need not be equivalent in cost, but additional costs should not be such that the alternative becomes undeliverable or unviable.
- If after applying the stages/ steps above a number of feasible alternatives have been identified, those should be subject to further consideration in terms of their relative effects on the integrity of the National Site Network, as compared to the project in question.
- At this final stage (comparison of feasible alternatives), feasible alternative solutions which are likely to give rise to similar adverse effects on the European site concerned, or the National Site Network, can be discounted.
- Finally, the availability of a feasible alternative solution with a lesser effect on integrity is not necessarily decisive. The principle of proportionality applies. An alternative providing marginal reduction in harm for corresponding material loss of public benefit may not be a proper alternative.

10 Step 1 – The Need

10.1 The Clear and Urgent Need for Hornsea Four

10.1.1.1 Climate change is the defining challenge of our time. The impacts of climate change are global in scope and unprecedented in human existence. The UK, in common with many other countries, has declared that we face a global 'climate change emergency'. By definition, an emergency is a grave situation that demands an urgent response.

10.1.1.2 Hornsea Four is a major renewable energy infrastructure project which responds to that imperative. It enacts fundamental and urgent national objectives articulated at the highest level in legislation and policy documents. That includes but is not limited to the Climate

⁴⁵ DEFRA 2012 discusses a tipping point "where an alternative is so very expensive or technically or legally difficult that it would be unreasonable to consider it a feasible alternative. The competent authority is responsible for making this judgement according to the details of each case."

Change Act 2008 ("CCA2008"), the Overarching National Policy Statement (NPS) for Energy (EN-1)⁴⁶ and the NPS for Renewable Energy Infrastructure (EN-3)⁴⁷ amongst others.

10.1.1.3 The Applicant's Application includes a Statement of Need (**Volume F1.6, Chapter 6: Statement of Need**) for Hornsea Four, prepared by Simon Gillett⁴⁸. This updates and complements the evidence base which supports EN-1 and EN-3 and demonstrates that offshore wind generation is an essential element of the UK's response to the climate emergency. The UK is particularly well placed to generate low carbon power from the plentiful wind in its surrounding waters. Offshore wind is therefore not only economically and technically viable in the UK, but it is economically competitive for the GB electricity consumer, and, proven and deliverable within the timeframes required to support decarbonisation.

10.1.1.4 The government has determined that the NPSs should be reviewed and in its December 2020 Energy White Paper⁴⁹, government signalled a review of the existing National Policy Statements, issuing draft versions of NPS EN-1 and EN-3 for consultation on 6th September 2021^{50 51}. While the Draft EN-1 confirms that the "Secretary of State has decided that for any application accepted for examination before designation of the 2021 amendments, the 2011 suite of NPSs should have effect in accordance with the terms of those NPS" the same document also states that "any emerging draft NPSs (or those designated but not having effect) are potentially capable of being important and relevant considerations in the decision-making process" (Paragraph 1.6.3). The Statement of Need (**Volume F1, Chapter 6: Statement of Need**) contains a synthesis of the 2021 Draft National Policy Statement EN-1 and shows that the demonstration of need for Hornsea Four set out in this Statement of Need is consistent with the updated arguments contained within the revised NPSs.

10.1.1.5 Cost reduction and affordability are particularly important in the context of offshore wind farm development. UK government policy and regulatory objectives seek to ensure affordability to consumers, through the Contract for Difference (CfD) auction process (generation assets) and Offshore Transmission Owner (OFTO) regime (offshore transmission assets). In broad terms, both seek to incentivise investment in low carbon electricity generation and transmission assets, ensure security of supply and help the UK meet its carbon reduction and renewables targets, whilst reducing cost to the consumer.

10.1.1.6 The key summary points of the need case are set out in

⁴⁶ Department of Energy and Climate Change (DECC) Overarching National Policy Statement for Energy (EN-1) Presented to Parliament pursuant to Section 5(9) of the Planning Act 2008. July 2011.

⁴⁷ DECC National Policy Statement for Renewable Energy Infrastructure (EN-3). Presented to Parliament pursuant to section 5(9) of the Planning Act 2008. July 2011.

⁴⁸ Mr Gillett has European energy sector experience, spanning 20 years of commercial, analytical, and consulting roles within Utilities and the Oil & Gas sector.

⁴⁹ HM Government, Energy White Paper: Powering our Net Zero Future. 2020.

⁵⁰ BEIS, Draft Overarching National Policy Statement for Energy (EN-1), BEIS, 2021.

⁵¹ BEIS, Draft National Policy Statement for Renewable Energy Infrastructure (EN 3), BEIS, 2021.

Table 10-1

~~10.1.1.6~~[10.1.1.7](#) ~~Table 10-1~~**Table 10-1.**

Table 10-1 Key Components of Need Case

No.	Details
1	Decarbonisation is a UK legal requirement and is of global significance. It cannot be allowed to fail, and urgent actions are required in the UK and abroad, to keep decarbonisation on track to limit global warming.
2	Wind generation is an essential element of the delivery plan for the urgent decarbonisation of the GB electricity sector. This is important not only to reduce power-related emissions, but also to provide a timely next-step contribution to a future generation portfolio, which is capable of supporting the decarbonisation of industrial, transport and heat sectors, through electrification.
3	As part of a diverse generation mix, offshore wind contributes to a secure GB generation mix through providing bulk low-carbon power from indigenous and renewable sources. Although wind generation is variable, the UK's Electricity System Operator continues to develop ways of integrating high penetrations of renewables while balancing the grid.
4	Internationally, and importantly Great Britain (GB) is leading in this regard. Offshore wind generation assets are getting bigger and cheaper and providing benefits to consumers in the process. Other low-carbon generation (e.g., tidal, nuclear or conventional fossil fuels with Carbon Capture, Utilization, and Storage (CCUS) remain potential contributors to achieving the government's net zero by 2050 commitment (as set out in the Climate Change Act 2008 (2050 Target Amendment) Order 2019), but their contributions in the 2020s, when many existing powered stations (both fossil fuel and low-carbon) are due to be decommissioned, is likely to be low.

~~10.1.1.7~~ 10.1.1.8 These important benefits of offshore wind apply specifically to Hornsea Four as set out in ~~Table 10-2~~ Table 10-2.

Table 10-2 How Hornsea Four Addresses the Need

No.	Details
1	<p>Hornsea Four is a substantial infrastructure asset, capable of delivering significant quantities of low-carbon electricity. With an anticipated capacity in the order of 2.6GW based on current knowledge relating to technology and grid capacity, Hornsea Four is expected to provide enough green electricity to power at least 2.3 million UK homes from the late-2020s.</p> <p>This is in line with advice from the UK's Committee on Climate Change (CCC)⁵², which highlights the need for <u>urgent action</u> to increase the pace of decarbonisation in the GB electricity sector and the UK government's ambition to deliver 40GW of offshore wind by 2030⁵³, which represents a quadrupling of the UK's offshore wind capacity within a decade.</p>
2	Hornsea Four will make a significant contribution to the UK's energy security and decarbonisation needs from the late 2020s. Hornsea Four's connection to the National Electricity Transmission System means that it will be required to play its part in helping National Grid manage the electricity system. This includes participating in the wholesale balancing markets including but is not limited to; helping balance supply and demand on a minute-by-minute basis; providing essential ancillary services); and providing visibility of its forecast generation at all times.

⁵²Climate Change Committee, June 2021. Progress in reducing emissions 2021 Report to Parliament. <https://www.theccc.org.uk/publication/2021-progress-report-to-parliament/>

⁵³ The Ten Point Plan for a Green Industrial Revolution. November 2020. HM Government https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936567/10_POINT_PLAN_BOOKLET.pdf

No.	Details
3	Maximising the capacity of generation in the resource-rich, accessible, and technically deliverable (former) Hornsea Zone, is to the benefit of all GB consumers, and the wind industry generally. The project is technically and economically feasible.

~~10.1.1.8~~ [10.1.1.9](#) In summary, through the delivery of an estimated 2.6GW, Hornsea Four will deliver an essential and substantial; near-term contribution to GB’s decarbonisation objectives and security of supply, at a highly competitive cost per megawatt hour (MW/h), thus helping to keep consumer bills in check throughout its operational life, addressing all important aspects of existing and emerging Government policy. It will also bring wider benefits, as discussed within [Part 3 \(Report to Demonstrate Imperative Reasons of Overriding Public Interest \(IROPI\)\)](#).

10.2 The Core Objectives of Hornsea Four

10.2.1.1 It is clear from the need described above that offshore wind must be deployed urgently, at scale.

10.2.1.2 The environmental (decarbonisation), regulatory, market and economic factors summarised above, drive and are fundamental to the core project objectives for Hornsea Four, set out in [Table 10-3](#) ~~Table 10-3~~ ~~Table 10-3~~ below.

Table 10-3: Core Project Objectives for Hornsea Four

No.	Hornsea Four Objective
1	<p>Support decarbonisation and security of the UK’s energy supply by developing a large-scale offshore wind farm to optimise generation and export capacity</p> <ul style="list-style-type: none"> Significant new offshore wind generation capacity is essential to help the UK meet its legally binding net zero by 2050 commitment and interim carbon budgets. A large-scale offshore wind farm responds to the urgent need for greater volumes of low carbon electricity, as established by NPS EN-1 and EN-3 and more recently the government’s Ten Point Plan for a Green Industrial Revolution⁵⁴ and Offshore Wind Sector Deal and 2020 Energy White Paper. A large-scale offshore wind farm in the former Hornsea Zone is consistent with national policy and offers the potential to maximise low-carbon generation from the significant wind resource found in that location. <p>Development at scale also supports:</p> <ul style="list-style-type: none"> diversity of generation profile of wind generation assets in GB; diversity in supply; and security of electricity supply in the UK in a cost-effective way; and economies of scale which enables cost efficiencies and low cost to the consumer (see Objective No. 2).
2	Develop a project at low cost to consumer

⁵⁴ The Ten Point Plan for a Green Industrial Revolution. November 2020. HM Government https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936567/10_POINT_PLAN_BOOKLET.pdf

No.	Hornsea Four Objective
	<ul style="list-style-type: none"> The CfD scheme is the government’s main mechanism for supporting low-carbon electricity generation. CfDs incentivise investment in renewable energy by providing developers with greater certainty and stability of revenues by reducing exposure to volatile wholesale prices. CfD allocation is subject to a competitive tender mechanism, whereby projects must submit ‘sealed bids’ in an auction for a fixed quantity of funding. This competitive auction mechanism is driving sharp reductions in the cost of offshore wind. For example, in 2015 East Anglia One obtained a strike price of £120/MWh in Auction Round 1, with the latest projects obtaining strike prices as low as £39.65/MWh in Auction Round 3 in 2019. <p>Successful participation in future CfD auction rounds necessitates bringing forward a strong, viable and competitive project by securing consent for a Maximum Design Scenario that facilitates:</p> <ul style="list-style-type: none"> technological innovation, such as larger turbines, increased export cable capacity and the ability for the promoter to utilise the full market potential when selecting key items – such as the transmission system; and adoption of optimum engineering solutions to increase efficiency and decrease costs; and benefit from economies of scale and benefit from a reduced generation cost per MWh.
3	<p>Deliver a significant volume of offshore wind in the 2020s (Hornsea Four could generate power from 2028 / 2029)</p> <ul style="list-style-type: none"> In March 2019, the UK government committed to deliver 30GW of offshore wind by 2030 as part of the Offshore Wind Sector Deal. This target has since been increased to 40GW and confirmed in the Energy White Paper: Powering our net zero future (2020). Offshore wind farms typically take at least 4 years to transition through the development phase and then at least 3 - 4 years to transition through the construction phase (see Figure 12-2 Figure 12-2). Projects not currently in planning (Development Consent Order (DCO) consenting) or development are unlikely to be in operation by 2030. In the context of the delivery timescales associated with other technologies, Hornsea Four is uniquely able to narrow the potential "generation gap" between 2028-2035. Generating power from 2028 / 2029 ensures Hornsea Four will contribute to meeting the urgent need and supporting offshore windfarm ambitions promoted by UK government - with time being of the essence in tackling climate change.
4	<p>Optimise the use of available sites by offshore wind development through further development within the former Hornsea Zone of the north-western portion</p> <ul style="list-style-type: none"> The current approach is that developers bid for sites or zones identified by The Crown Estate (TCE) through leasing rounds. Qualifying sites and projects are limited to offshore wind technology. This approach utilises and seeks to optimise available seabed already identified, through Strategic Environmental Assessment (SEA) and plan-level HRA, as among the least constrained around the UK for a rapid increase in offshore wind deployment at scale. Optimises development opportunity within the former Hornsea Zone through the identification of the most technical and environmentally suitable development sites. Development of the former Hornsea Zone within the constraints across the former zone identified through zone appraisal and planning process, to ensure a scheme that can be delivered safely and efficiently, while minimising impacts.

No.	Hornsea Four Objective
	<ul style="list-style-type: none"> TCE has no current or planned offshore leasing rounds for any renewable technology other than offshore wind (which includes both fixed and floating WTGs). Large scale sites outside the former Hornsea Zone or the established Round 3 leasing sites are not deliverable within the identified timescales (see Objective No. 3 on timing).
56	<p>Develop an array which makes optimal use of viable developable seabed within the western portion of former Hornsea Zone</p> <p>Within the boundary of the DCO, bring forward strong, viable developable area that:</p> <ul style="list-style-type: none"> Optimises wind capture across the array; Minimises wake loss through creating efficient layouts and WTG positioning; Optimises array cable, interconnector, and export cable layouts; and Minimises impacts on relevant environmental receptors (e.g., ornithological receptors). <p>An array layout that:</p> <ul style="list-style-type: none"> Responds to variable water depths; Responds to variable site conditions, including but not limited to areas where geotechnical and ground conditions may not lend themselves to efficient WTG installation; Provides for array layout principles which respond to maritime, aviation and search and rescue objectives; and Provides for appropriate setbacks from established oil and gas operations, pipelines and other existing assets and hard constraints.
67	<p>Make efficient use of available grid connection capacity</p> <ul style="list-style-type: none"> Identification of an economic and efficient national grid connection point, including network reinforcements that may be needed. Consideration of connection capacity available to allow delivery within suitable timeframes (see Objective No. 3 above), and anticipated connection date. A project must be suitably sized to justify the extended distance between point of generation and point of grid connection. Limit the need for extending the national grid network (and the deployment of overhead lines). A project which did not utilise the full grid connection capacity available / offered to Hornsea Four would be sub-optimal.
78	<p>To be delivered in a safe and efficient manner</p> <ul style="list-style-type: none"> Ensure health, safety, and environment (HSE) considerations are foremost in design development, equipment selection, installation procedures and ongoing operation and maintenance activities. Design and management of a scheme does not give rise to unsatisfactory risk to other sea users.
89	<p>To provide flexibility to allow for future technological innovation which would complement a Hornsea Four wind farm</p> <ul style="list-style-type: none"> Energy storage to support interaction with the grid and minimise impacts of intermittency. Ancillary services to provide local grid support. Renewable Hydrogen Production to increase demand and enable higher utilisation of renewable energy. Neighbouring platform electrification to support decarbonisation of hard to abate industries.

11 Step 2 – Relevant Works and Residual Potential Harm

11.1.1.1 At the conclusion of the Appropriate Assessment (see the RIAA ([Volume 2, Chapter 2: Report to Inform Appropriate Assessment](#))) it was determined beyond reasonable scientific doubt that ~~Adverse Effects on Integrity (AEI/AEoI)~~ could be discounted for [gannet, razorbill and guillemot](#) all features of the ~~Flamborough and Filey Coast SPA (FFC SPA)~~. ~~However, on the basis as set out in paragraph 1.2.1.7 an adverse AEoI in respect of the kittiwake feature cannot be ruled out, but not kittiwake (as explained in paragraph 1.2.1.51.2.1.5).~~ The evidence and submissions concerning the residual potential impacts on the relevant features of the European site are provided in [Part 1](#) of the derogation information and summarised in ~~Table 11-1~~[Table 11-1](#)~~Table 11-1~~. This ~~without prejudice~~ derogation case is being presented to address the risk that the SoS concludes otherwise; ~~(without prejudice in relation to gannet, razorbill or guillemot).~~

Table 11-1: Relevant European Sites and Features Potentially Affected as a Result of Hornsea Four.

European Site	Relevant Qualifying Feature	Relevant Impact from Hornsea Four
Flamborough and Filey Coast SPA	Breeding kittiwake feature	Collision risk mortality
	Breeding gannet feature	Collision risk mortality Disturbance and displacement mortality Combined impact of collision & displacement
	Breeding guillemot feature	Disturbance and displacement mortality Barrier effect
	Breeding razorbill feature	Disturbance and displacement mortality Barrier effect

11.1.1.2 In respect of kittiwake and gannet the identified impact is collision risk, which arises from the operation of the wind turbines during the operational period. The primary aspects of the maximum design scenario (MDS) relevant to or which may influence collision risk during operation are:

- i. array location (relative to FFC SPA);
- ii. number of turbines;
- iii. maximum rotor swept area;
- iv. height of turbine blades above sea surface (bird densities are lower at higher altitudes due to the skewed nature of bird flight height distribution (Johnston et al., 2014)⁵⁵; and
- v. operational period.

11.1.1.3 For gannet, guillemot and razorbill, the identified impact is displacement, which is influenced by the area and location within which turbines are sited.

11.1.1.4 Changes (i.e., alternatives) to any other elements of the MDS, outside of those specified above, would have no bearing on collision risk for kittiwake and gannet, and the

⁵⁵ Johnston, A., Cook, A.S.C.P., Wright, L.J., Humphreys, E.M., Burton, N.H.K., 2014. Modelling flight heights of marine birds to more accurately assess collision risk with offshore wind turbines. *J. Appl. Ecol.* 51, 31–41

displacement of gannet, guillemot, and razorbill respectively, and cannot be alternative solutions.

12 Step 3: Consideration of Alternatives

12.1 Scope of Alternatives Consideration

12.1.1.1 In his decision on Hornsea Three⁵⁶, the SoS published the following advice on the scope of alternatives that required consideration:

“the Secretary of State does not consider the development of alternative forms of energy generation to meet the objectives for the Project. Alternatives to the Project considered by the Secretary of State are consequently limited either to Do Nothing or to alternative wind farm projects.

Alternative types of wind farm projects considered are:

- Offshore wind farms not in UK Exclusive Economic Zone (EEZ);
- Offshore wind farms within UK EEZ, including:
 - Within the former Hornsea Zone;
 - At other locations available to the Applicant;
 - Within other Zones leased from The Crown Estate by other developers;
 - Within Zones to be leased by The Crown Estate under the Licensing Round 4”

12.1.1.2 The Applicant agrees with the decision of the SoS for Hornsea Three described above, and has therefore limited the consideration of alternatives for Hornsea Four to:

- Do Nothing
- Alternative types of wind farm projects which are:
 - Offshore wind farms not in UK Exclusive Economic Zone (EEZ);
 - Offshore wind farms within UK EEZ, including:
 - Within the former Hornsea Zone;
 - At other locations available to the Applicant;
 - Within other Zones leased from The Crown Estate by other developers;
 - Within Zones to be leased by The Crown Estate under the Licensing Round 4.

12.1.1.3 In addition, project design alternatives have also been considered in Section [12.10](#).

12.2 “Do Nothing”

12.2.1.1 In the context of Hornsea Four, the “do nothing” option would comprise not proceeding with the project at all. This would remove any possibility of harm to all qualifying features in [Table 11-1](#)~~Table 11-1~~~~Table 11-1~~. However, the requirement for the project, and its core objectives would not be met.

12.2.1.2 The ‘no project scenario’ can be immediately discounted as it would not meet any of the core project objectives for Hornsea Four and would (at best) ignore and (at worst) hinder

⁵⁶ department for Business, Energy and Industrial Strategy Hornsea Project Three Habitats Regulation Assessment and Marine Conservation Zone Assessment. December 2020. Available [here](#)

efforts to respond the clear and urgent need for offshore wind deployment at scale, before 2030, to help the UK to meet its legally binding net zero by 2050 commitment to mitigate the effects of climate change.

12.2.1.3 To do nothing is not a realistic option unless one ignores a raft of Government policy: NPS EN-1 and EN-3, the net zero by 2050 commitment, and the UK government's commitment to deliver 40 gigawatt (GW) of offshore wind by 2030, as set out in the UK governments Ten Point Plan for a Green Industrial Revolution (November 2020) up from the 30 GW target originally set out in the Offshore Wind Sector Deal. There is an imperative need for renewable energy schemes and for offshore wind in particular; a need which is beyond argument and grows more urgent with each passing month ([Volume F1, Chapter 6: Statement of Need](#)).

12.2.1.4 Given the need to tackle pressing climate change, a "do nothing" approach is inappropriate. It is not compatible with a climate emergency to wait and see if the development of other potential future offshore wind projects means Hornsea Four is not required. Any suggestion that other (yet to be identified) projects could make up for the loss of Hornsea Four fundamentally misunderstands the scale of the task in hand and the long lead-time for offshore wind development.

12.2.1.5 If Hornsea Four is abandoned, a project with the scope to provide a capacity of at least 2.6 GW before 2030 would be lost. Hornsea Four's contribution represents 33% of the capacity of offshore wind farm projects in- examination, in determination or in re-determination which are Norfolk Boreas, Norfolk Vanguard, East Anglia One North and East Anglia Two (total capacity including Hornsea Four of 7.9GW)⁵⁷.

[12.2.1.6](#) Presented in

[12.2.1.7](#)

[12.2.1.8](#)

⁵⁷ Estimated in April 2021 with reference to information available on the Planning Inspectorate website [link](#).

Figure 12-1



12.2.1.6 12.2.1.9 Figure 12-1 Figure 12-1 is a chart illustrating the contribution of Hornsea Four (in GW) compared to the total generating capacity of other projects in the planning system as of 1/9/21.

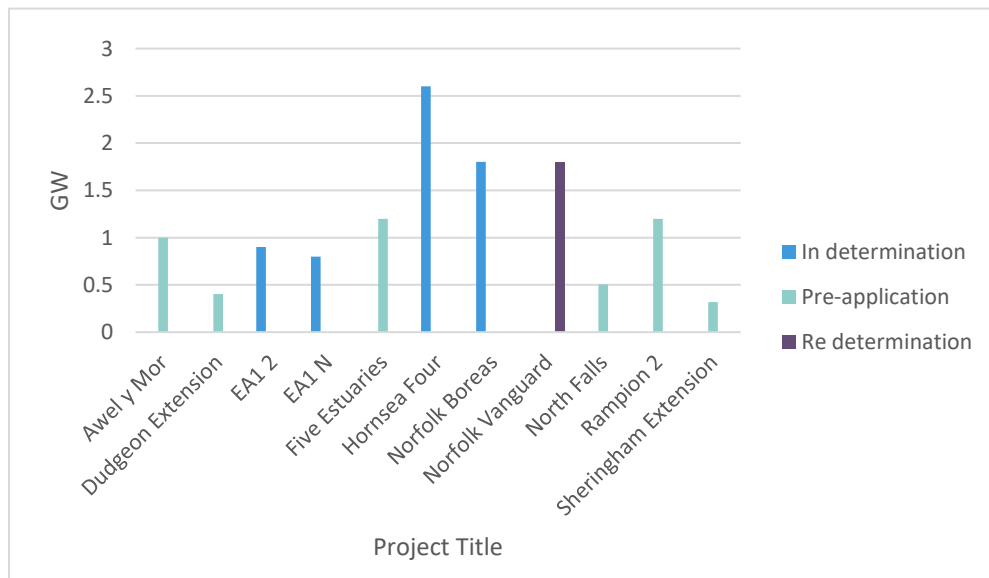


Figure 12-1 Contribution of Hornsea Four to total capacity of Offshore Wind Farm project within the planning system as of 1/9/21.

[12.2.1.7](#)[12.2.1.10](#) TCE has calculated indicative timeframes for offshore wind based on its experience of previous offshore wind leasing rounds as shown on the figure below⁵⁸. Given the consenting /leasing timescales (see [Figure 12-2](#)~~Figure 12-2~~~~Figure 12-2~~), it would not be possible for this volume of capacity to be fulfilled by another project. The scale of the targets for offshore wind (40 GW by 2030 – a quadrupling of the UK’s current installed offshore wind capacity), the short timescales for delivery (less than 9 years) and prevalence of offshore environmental and technical constraints, mean that lost capacity cannot be offset or replaced by other offshore wind projects that are planned and may (or may not) come forward in time or in sufficient scale.



Figure 12-2 Indicative Time Frames for Delivering New Offshore Wind Farm Projects.

[12.2.1.8](#)[12.2.1.11](#) This underlines the fundamental importance of optimising the capacity of existing areas of seabed or Zones (e.g., former Hornsea Zone) already identified and leased for offshore wind development as part of Round 3 and consenting offshore wind farms in the system, which are deliverable by 2030, urgently.

[12.2.1.9](#)[12.2.1.12](#) It is possible that six remaining extension projects (Thanet Extension having been refused consent) identified in TCE’s Extensions leasing round could be constructed and in operation by 2030, but that would require accelerated delivery

⁵⁸ The Crown Estate (2019). Offshore wind operational report, January – December 2018.

timetables ahead of average historic timescales for offshore and would depend on consents being in place to allow participation in a CfD auction round in or around 2025/2027.

~~12.2.1.10~~12.2.1.13 Furthermore, the total upper capacity of all six extension projects combined is 2.51GW. It would be necessary for all six extension projects to be delivered to their maximum anticipated capacity, within an accelerated development timeframe, to make up the lost capacity if Hornsea Four does not proceed.

~~12.2.1.11~~12.2.1.14 That is not realistic, given offshore development attrition rates, environmental constraints (that constrain capacity), typical consenting and construction timescales (and risk of delays), and potential constraints on the capacity that can come forward in any given CfD auction round. Moreover, the purpose of the extensions projects is to provide additional capacity, not make up a "capacity gap" created by abandoning or refusing consent for Round 3 projects such as Hornsea Four.

~~12.2.1.12~~12.2.1.15 TCE's Round 4 offshore wind leasing round creates the opportunity for just under 8 GW of new offshore wind projects in the waters around England and Wales. In February 2021, the TCE announced six Round 4 projects that are due to be taken forward to the next stage. These will be subject to a plan level HRA that has yet to be carried out and may affect the shape, scale, and timing of development. The HRA is expected to conclude in Spring 2022. The maximum individual project size is set at 1.5GW so no individual project progressed via Round 4 would make the same contribution as Hornsea Four.

~~12.2.1.13~~12.2.1.16 With rights for Round 4 projects awarded by TCE in 2021, applying typical development timescales and noting that the projected dates for connection of Round 4 projects on the National Grid's Transmission Entry Capacity (TEC) Register⁵⁹ are all post 2030, these projects are unlikely to be generating power on any scale before 2030 (early-mover projects would likely only move into construction in 2029 after securing a DCO). These projects would not therefore meet core project **Objective No.3** (see [Table 10-3](#)~~Table 10-3~~~~Table 10-3~~) (generating power within 2020s) and would not address the need to deliver 40GW of offshore wind by 2030.

~~12.2.1.14~~12.2.1.17 TCE is also planning a leasing round for floating wind projects in the Celtic Sea to support the Government's ambition to deliver 1 GW of floating wind by 2030. The leasing process will focus on projects of circa 300MW in scale. These projects are expected to typically be of a smaller scale than fixed offshore WTGs and if the governments ambition of 1 GW by 2030 is achieved this would make up less than half of what Hornsea Four would contribute. The floating wind projects would therefore not make up the lost capacity if Hornsea Four does not proceed

~~12.2.1.15~~12.2.1.18 The six extension projects and the projects that have come out of the TCE's Round 4 offshore wind leasing round, and the floating wind round, even if they could come forward within the timeframe, will also have to be subject to environmental impact assessment and HRA owing to likely connectivity with European sites. These projects will

⁵⁹ <https://www.nationalgrideso.com/document/183631/download> Accessed 24/6/21

also have to carry out an HRA and could also lead to adverse effects on the National Site Network.

~~12.2.1.16~~^{12.2.1.19} To conclude, reliance on announced future offshore wind leasing rounds (or further rounds) can be immediately discounted as it would not meet core project Objectives No. 3, 4, 5 and 6 (see ~~Table 10-3~~^{Table 10-3}~~Table 10-3~~) and would not respond to scale and urgent nature of the identified need. Moreover, the urgent need to mitigate climate change and consequent demand for deployment of offshore wind, at scale, by 2030, means that a “do nothing” (or a ‘wait and see’) approach is not an option.

~~12.2.1.17~~^{12.2.1.20} This conclusion is consistent with DEFRA 2012, which acknowledges that the “do-nothing” option is normally not an alternative solution as it would not, as here, deliver the objective of the proposal⁶⁰, and the precedents set by the Able Marine Energy Park (AMEP) and Hornsea Three Decision⁶¹.

12.3 Array Locations not in the UK EEZ

12.3.1.1 Alternative sites for offshore wind farms outside the UK would not meet any of the core project objectives for Hornsea Four and would provide no contribution to the identified UK need. In the recent decision on Hornsea Three, the Secretary of State confirmed that “it does not consider offshore wind farm projects that are located outside UK territorial waters⁶² as being an alternative to the Project [Hornsea Three] *since this would not meet the objective to support the decarbonisation of the UK electricity supply and UK commitments on offshore wind generation*”⁶³.

12.3.1.2 Although the UK is party to international treaties and conventions in relation to climate change and renewable energy, according to the principle of subsidiarity and its legally binding commitments under those treaties and conventions, the UK has its own specific legal obligations and targets in relation to carbon emission reductions and renewable energy

⁶⁰ DEFRA guidance, at paragraph 17.

⁶¹ Department for Business, Energy and Industrial Strategy Hornsea Project Three Habitats Regulation Assessment and Marine Conservation Zone Assessment. December 2020. Available [here](#)

⁶² Assumed to mean the UK EEZ

⁶³ Department for Business, Energy and Industrial Strategy Hornsea Project Three Habitats Regulation Assessment and Marine Conservation Zone Assessment. December 2020. Available [here](#)

generation. Other international and EU countries similarly have their own (different) binding targets.

12.3.1.3 As such, sites outside the UK cannot count towards the need identified by UK policy. Conversely, sites outside the UK are required for other Member States and countries to achieve their own respective targets in respect of climate change and renewable energy.

12.3.1.4 It is therefore self-evident that locations outside the UK cannot be an alternative solution to Hornsea Four.

12.4 Array Locations Outside the Former Hornsea Zone

12.4.1.1 Offshore wind development(s) located outside the former Hornsea Zone can be discounted on one or more of the following grounds:

- such development would not meet core project Objectives No. 1, 3, 4, 5 and 6 (see [Table 10-3](#))
- such development is not feasible (for the Applicant);
- such development is complimentary (not an alternative) to Hornsea Four given the scale and urgency of the need;
- such development may have similar adverse effects on European site(s); and
- even if it is assumed that such development could have lesser effects on European site(s), the strength and urgency of the IROPI case demands implementation of Hornsea Four in addition to or in preference.

12.4.1.2 In [this](#) determination of Hornsea Project Three⁶⁴, the SoS considered Alternatives to the development and determined that for the reasons set out in the HRA, which are replicated above for Hornsea Four, that no alternative solutions are available with respect to alternative wind farm projects both within and out-with the UK Exclusive Economic Zone (EEZ) ~~(see para 6.32).~~

12.4.1.3 TCE own and/or hold the exclusive rights to manage the leasing of seabed for offshore wind development within UK territorial waters and the UK EEZ, with seabed made available for offshore wind development selectively, in successive offshore leasing rounds, usually several years apart. Locations outside the former Hornsea Zone cannot be alternative solutions for the reasons set out in the sections below.

12.5 Repowering Existing Offshore Wind Farms

12.5.1.1 The majority of operational wind farms to date typically have a life span of 20 to 25 years before decommissioning is planned and these assets will not reach their decommissioning stage for another decade. The timeframes involved for the decisions on repowering therefore do not meet project [Objective No. 34](#) in contributing to the 2030 Sector Deal target. Furthermore, due to rapid technological advances in the size of turbines (increase rotor diameter from 120_m (3.6_MW) in 2013 to 260_m (12_MW) in 2021), it is highly likely to

⁶⁴ Department for Business, Energy & Industrial Strategy – Consideration of Orsted Hornsea Project Three (UK) Limited. Letter dated 31 December 2020. Available [here](#)

be not technically feasible to pair foundations designed for smaller capacity turbines with larger turbines due to fundamental technical constraints. Newly designed and built windfarms are likely to present the only means of repowering, requiring new consent.

12.6 ScotWind Leasing

12.6.1.1 In June 2020, The Crown Estate Scotland launched the Scotwind leasing round to grant property rights for seabed in Scottish water for new commercial scale offshore wind projects. The closing date for applications was 16 July 2021. In October 2020, the final Sectoral Marine Plan for Offshore Wind Energy ("the Plan") and Offshore Wind Policy Statement (OWPS) was published. The Plan, which was published by Marine Scotland, sets out the most suitable sustainable locations for the future development of commercial offshore wind energy. The Plan provides the strategically planned spatial footprint for offshore wind development in Scotland and identifies 15 Plan Options ("POs"), split across 4 regions which are capable of generating several GW of renewable energy. A Strategic Habitat Regulations Appraisal has been carried out of the Sectoral Marine Plan for Offshore Wind Energy⁶⁵. It should be noted that these projects do not necessarily represent alternatives with less damaging ecological impacts and that a project level HRA will be required of each project in due course.

12.7 Round 3

12.7.1.1 The identification of the former Hornsea Zone (and other Round 3 Zones) was the output of a robust Government and TCE spatial planning process involving SEA to identify / indicate relative levels of constraint and opportunity, and an Appropriate Assessment (AA) by TCE of its plan to award the nine Zone Development Agreement (ZDAs).

12.7.1.2 Out of the nine zones identified during the TCE Round 3 process, only six of the zones have progressed. Within the former East Anglia Zone, East Anglia ONE North, East Anglia TWO, Norfolk Vanguard and Norfolk Boreas are in the planning phase. The former Hornsea Zone, within which Hornsea Four is located, was identified through this process along with other Round 3 Zones. However, the consenting of other Round 3 OWFs does not lessen the scale or urgency of the need for further large-scale offshore wind projects. In order to meet the 2030 Sector Deal, the majority, if not all of the ~~921.2~~221.2 GW in pre-planning and planning, ~~499.8~~GW in pre-construction and construction, and 18 GW in Round 4 and ScotWind are

⁶⁵ Sectoral Marine Plan for Offshore Wind Energy Strategic Habitat Regulations Appraisal (HRA): screening and Appropriate Assessment Information Report – Final December 2019 <https://www.gov.scot/binaries/content/documents/govscot/publications/impact-assessment/2019/12/draft-sectoral-marine-plan-offshore-wind-energy-habitat-regulations-appraisal/documents/sectoral-marine-plan-offshore-wind-energy-strategic-habitat-regulations-appraisal-screening-appropriate-assessment-information-report-final/sectoral-marine-plan-offshore-wind-energy-strategic-habitat-regulations-appraisal-screening-appropriate-assessment-information-report-final/govscot%3Adocument/sectoral-marine-plan-offshore-wind-energy-strategic-habitat-regulations-appraisal-screening-appropriate-assessment-information-report-final.pdf>

likely to be required, on top of the 1310.4_GW in operation⁶⁶. These are not, therefore, considered to be alternative solutions.

12.7.1.3 The location and boundaries of the former Hornsea Zone were determined by TCE and are beyond the control of the Applicant.

12.8 Round 4

12.8.1.1 Round 4 projects are very unlikely to be generating power on any scale before 2030. These projects would not meet core project Objective No. 3 (see [Table 10-3](#)~~Table 10-3~~~~Table 10-3~~) generating power from 2028/ 2029) and would not address the Government's target to deliver 40 GW by 2030. Furthermore, regardless of timescales, they are still needed in addition to, not instead of Hornsea Four to meet the 40 GW target.

12.8.1.2 Given the mobile nature and large foraging ranges of many of the qualifying species, any comparable large-scale offshore wind proposal located in the North Sea is highly likely to give rise to similar types of impacts on FFC SPA (alone or in-combination). Furthermore, given the number and spread of European sites around the UK, any large-scale offshore wind proposal is likely to affect one or more European sites to some degree. This is illustrated through the constraint mapping and regional characterisation reports published in connection with Leasing Round 4⁶⁷. Furthermore, the Round 4 projects are subject to a plan level HRA that has yet to be carried out and may affect the shape, scale, and timing of development. Each project will also be subject to a project level HRA. In other words, the notion that unidentified and unconstrained areas exist to deliver the scale of development required, without effects on the integrity of European sites is improbable.

12.9 Alternative Array Locations within Former Hornsea Zone

12.9.1.1 The identification of project sites within the former Hornsea Zone was carried out using the process of Zone Appraisal and Planning as recommended by TCE specifically for Leasing Round 3 and endorsed within NPS EN-3. This process was designed to identify areas of least constraint and greatest opportunity. Details in relation to identification of the areas for the Hornsea projects (One, Two, Three and Four) are provided in [Section 3.5.2](#) of [Volume A1, Chapter 3: Site Selection and Consideration of Alternatives](#) of the Environmental Statement (ES).

12.9.1.2 The targets for offshore wind have increased, not reduced since the Hornsea Projects One, Two and Three were consented and so their existence does not lessen the scale or urgency of the need for further large-scale offshore wind projects, either in general terms or within the former Hornsea Zone.

12.9.1.3 As set out in section 2.11 below and in [Section 3.5.4](#) of [Volume A1, Chapter 3: Site Selection and Consideration of Alternatives](#) of the ES, prior to selecting the final Hornsea Four array

^{66,6} Figures given for the UK including rights granted by Crown Estate Scotland. Source: The Crown Estate Project Listings March 2021 UK offshore wind farm projects from planning through to operational phases. Available [here](#)

^{67,7} Characterisation Area Reports (Bidding Area): <https://www.thecrownestate.co.uk/en-gb/what-we-do/on-the-seabed/offshore-wind-leasing-round-4/round-4-document-library/>

area to be taken forward for consent, the Applicant carefully assessed the Hornsea Four Agreement for lease (AfL) area via the Developable Area Approach (DAA), being mindful that the Hornsea Four AfL area comprised the area of greatest potential constraint and reduced development opportunity of the former Hornsea Zone. Throughout the development process and making best use of the environmental, commercial, and technical information at every stage of the design evolution, the Hornsea Four site was refined based on detailed analysis, in the context of the project objectives (specifically core project Objectives No. 5, 6 and 7) (See [Table 10-3](#)~~Table 10-3~~~~Table 10-3~~).

12.9.1.4 Furthermore, given the foraging range and behaviour of a number of the qualifying species of FFC SPA, all possible locations for commercial scale offshore wind farms within the former Hornsea Zone have connectivity with one or more species from the FFC SPA and are in a similar position (to greater or lesser degrees) with regard to potential impacts on qualifying species of FFC SPA, adding to existing in-combination impacts. There is no location within the former Hornsea Zone that could be developed without impacts on species from FFC SPA.

12.10 Consideration of Feasible Design Alternatives for Hornsea Four

12.10.1.1 The potential options considered at this stage have included the:

- Number of turbines (and their layout);
- Minimum lower tip height (height of turbine blades above sea surface) and rotor diameter; and
- Developable area.

12.10.1.2 Consideration has been given to feasible alternatives throughout the development process for Hornsea Four. This has formed a fundamental driver for decision making within the project, from the technical options within the engineering side to the macro-siting (avoidance of large-scale features and designated sites) and route optioneering during the development of the Hornsea Four Electrical Cable Corridor (ECC) routing. The Applicant has continued to re-appraise all elements of the MDS for Hornsea Four, to ensure that feasible and practical mitigation has been deployed, where deemed appropriate to do so (to eliminate or reduce likely significant effects (LSE), in EIA terms). Hornsea Four has adopted commitments (primary design principles inherent as part of Hornsea Four, installation techniques and engineering designs/modifications) as part of their pre-application phase, to eliminate and/or reduce the LSE arising from a number of impacts (as far as possible). These are outlined in full in [Volume A4, Annex 5.2: Commitments Register](#).

12.10.1.3 An important part of the Hornsea Four development process has been the consideration of potential options, selection, and the subsequent refinement of project infrastructure. [Volume A1, Chapter 3: Site Selection and Consideration of Alternatives](#) summarises the site selection process for Hornsea Four (including route planning), [a comparison] of alternatives considered and the reasons for selecting the chosen option. The

following sections describe the design alternatives considered and this is summarised in [Table 12-1](#)~~Table 12-1~~~~Table 12-1~~.

12.10.1.4 Consultation is a key part of this process informing all stages and has helped to refine the project through wider spatial, design and process considerations discussed in broader forums, both formally through Evidence Plan meetings, Developable Area Approach (DAA) workshops or more informally through the feedback received through public consultation. Consideration was given to several technical, commercial, and environmental consenting constraints ([Section 7.1](#) of [Volume A4, Annex 3.2: Selection and Refinement of the Offshore Infrastructure](#)) informed by data analysis and constraints mapping prior to presentation and consultation with key stakeholders via the Developable Area Approach Workshops. Full details of the project consultation process and mechanisms are presented within [Volume A1, Chapter 6: Consultation and B1.1: Consultation Report](#). –A summary of the pertinent considerations for the FFC SPA are summarised below.

12.10.2 Number of Turbines (and their layout)

12.10.2.1 At project inception (Q4 2017) through the EIA Scoping (Q4 2018) consideration was given to the development capacity and number of turbines that would comprise the final consent application for Hornsea Four. The Applicant sought to strike a balance between the known environmental capacity at the site (Hornsea Four being the fourth project within the zone and therefore the greatest constrained) with development aspirations (unconstrained demand for renewable energy). In seeking to balance these factors, the Applicant considered the development potential for Hornsea One (332 x turbines within 407km²), Hornsea Two (360 x turbines within 462 km²) and Hornsea Three (300 x turbines within 696 km²) at the point of DCO Application. At this early stage the Hornsea Four AfL comprised an area of 868km², approximately twice the development area of Hornsea One and Hornsea Two therefore with a development potential of 600 – 700 turbines (assuming the same turbine density per km²).

12.10.2.2 Early design considerations for Hornsea Four comprised a number of iterations all of which had a single line of orientation, as determined by the Search and Rescue (SAR) lines as consented and built on Hornsea One and Hornsea Two. Along these lines of orientation, varying densities of turbine layouts were considered from 8.83 to 3.04 MW/km². In Feb 2018, the total numbers of turbines under consideration ranged from 452 to 190, comprising approximately 20 different layout configurations, all of which were considered and assessed at a high-level for the impacts upon environmental, technical, and commercial considerations.

12.10.2.3 By May 2018 the upper limit of turbine numbers had been reduced to 330, and by June further reduced to 260 because of changes to expected turbine capacity, internal array density and early evaluation of the environmental, technical, and commercial constraints at the site (i.e., oil and gas assets, shipping and navigation interests, ornithological species, water depths and ground conditions). Further internal evaluation between June 2018 and

EIA Scoping (Oct 2018) reduced the upper number of turbines to 180 while maintaining the project need and objectives.

12.10.2.4 The proposed turbine design presented at Scoping and maintained throughout the EIA process to DCO Application is that of an 'envelope' which includes necessary flexibility to accommodate further project refinement and optimisation during detailed design. This "maximum design scenario" (MDS) is 180 wind turbines of undefined capacity. The ultimate capacity of the project (180 x undefined capacity) can only be determined post-consent upon selection of the turbine provider. The project has been therefore assessed in terms of its MDS (180 x turbines) (and the overall construction window) to secure the necessary engineering and commercial flexibility to bring forth a competitive and deliverable project.

12.10.2.5 As the project has evolved from Scoping (October 2019) through to DCO Application (September 2021) further design iterations have been considered to eliminate or reduce potential likely significant effects (in EIA terms). These are set out in the following sections. At all of these stages' consideration has been given to the number of turbines within the design envelope and steps taken to maximise the development potential of the site by making design commitments to maintain the commercial attractiveness and need for Hornsea Four. This includes raising the turbine blade lower tip height which significantly reduces the environmental impact (by raising the rotor diameter above higher densities of key bird species in flight) while maintaining the required commercial flexibility and technical and economic viability of the project. A further reduction to the proposed maximum of 180 WTC's is not considered feasible, for the following key reasons:

12.10.2.6 Optimising the business case to fulfil the project need and objectives is essential to develop a viable project. Hornsea Four must compete for a CFD in a competitive tender – without which it may not attract finance to be constructed and therefore not contribute to the mitigation of the "climate emergency". The remaining area of the proposed project site must be sufficient to accommodate 180 turbines, as a lesser number is likely to reduce our ability to optimise the wind farm layout and maximise energy yield and reach the available grid connection capacity (2,600 MW / 180 = 14.4 MW Turbines). It is critical that we fully optimise, in particular, the transmission system to align with the grid capacity. As we cannot yet know the configuration of the transmission system (currently designed on 180 x 14.4MW turbines to attain grid capacity of 2.6GW) or the turbine capacity (in MW) available on the market at the time of construction (2027-28), Hornsea Four require the possibility to install 180 turbines to meet the grid connection capacity available and thereby fulfil the project need and objectives.

12.10.2.7 As a final point, the Applicant has considered an alternative scenario of temporary operational shutdown as an alternative. The imposition of temporary operational shutdowns of turbines could only realistically be considered for species with a distinct and

well-established migratory behaviour which occurs over a brief period of time – a scenario that does not apply to the features of the FFC SPA under consideration.

12.10.3 Minimum lower tip height (height of Turbine Blades Above Sea Surface)

12.10.3.1 The Applicant has committed (Commitment Co138 in the Commitment Register ([Volume 4, Chapter 5, Annex 2](#)) to raising the height of the turbine blades above the sea surface and therefore moving the rotor swept area to altitudes where bird densities are lower due to the skewed nature of bird flight height distribution (Johnston *et al.*, 2014). Collision risk modelling (CRM) indicates that this is an effective way of reducing the collision risk. In raising the lower tip height the Applicant has raised the rotor diameter to heights where lower risk of collisions prevail and thereby negating the driver to reduce rotor diameter.

12.10.3.2 The Applicant has engineered a significantly reduced risk from collision to kittiwake and gannet by incorporating a revised project design for the DCO application with a raised minimum tip height commitment (the distance between sea level and the lower turbine tip or air gap). The lower air draught of wind turbines will be a minimum of 40 m above Mean Sea Level (MSL) (42.43 m above LAT), to a new “industry record”. The lower tip height being raised from 35m above LAT at Scoping and Preliminary Environmental Information Report (PEIR), providing further reductions to potential risk to seabirds. See: [DCO Requirement 2\(2\)\(c\) \(Detailed offshore design parameters\)](#) and [DCO Schedule 11, Part 2 - Condition 1\(2\)\(c\) \(Design parameters\)](#).

12.10.3.3 With regards to the ability for the project to make any further heights above 42.43 m LAT, the combination of the increased WTG hub height which would be required by a further increase in minimum lower tip height, plus vessel availability, crane suitability and specific local seabed/soil conditions, result in a complex set of requirements which cannot yet be met by the existing supply chain. The Applicant is not aware of any existing tower suppliers or wind turbine installation vessels which have the capability to lift blades to heights greater than 40 m MSL on turbines with hub heights above 150 m. The Applicant expects that the market will evolve and mature to allow higher lower tip heights at a currently undefined point in the future (dependent upon market evolution), but we cannot make a commitment to realising this until we have specific technical and market information which gives us the certainty we need.

12.11 Developable Area

12.11.1.1 Hornsea Four gave due consideration to the size and location (within the Area for Lease (AfL) array area) of the final project to be taken forward to consent application. This consideration was captured internally as a “Developable Area Approach” (DAA), which includes the consideration of physical, biological, and human constraints in refining the developable area, balancing consenting, and commercial considerations with technical feasibility for construction.

12.11.1.2 The array area is technically constrained by variable seabed and subsurface geological conditions, presenting a challenge for turbine foundation installation.

Ornithology was identified as a key environmental constraint due to the relative proximity of the Hornsea Four site to the Flamborough and Filey Coast (FFC) Special Protection Area (SPA) (67km at closest point) and hence required detailed consideration through the DAA. Furthermore, commercial considerations for AfL refinement included proximity and crossing options at oil and gas infrastructure assets and other commercial entities including shipping operators through the DAA process. The review of constraints in relation to the offshore array is set out in detail in [Section 7.1 of ES Volume A4, Annex 3.2](#), with the final array footprint set out in [Figure 10 of Volume A4, Annex 3.2](#).

12.11.1.3 The outcome of the DAA was the adoption of three major site reductions from the AfL presented at Scoping (846 km²) to the PEIR boundary (600 km²), with a further reduction adopted for the ES and DCO application (468 km²) due to the findings of the impact assessment presented at PEIR, technical considerations and stakeholder feedback (see [Figure 12-3](#) ~~Figure 12-3~~ ~~Figure 12-3~~).

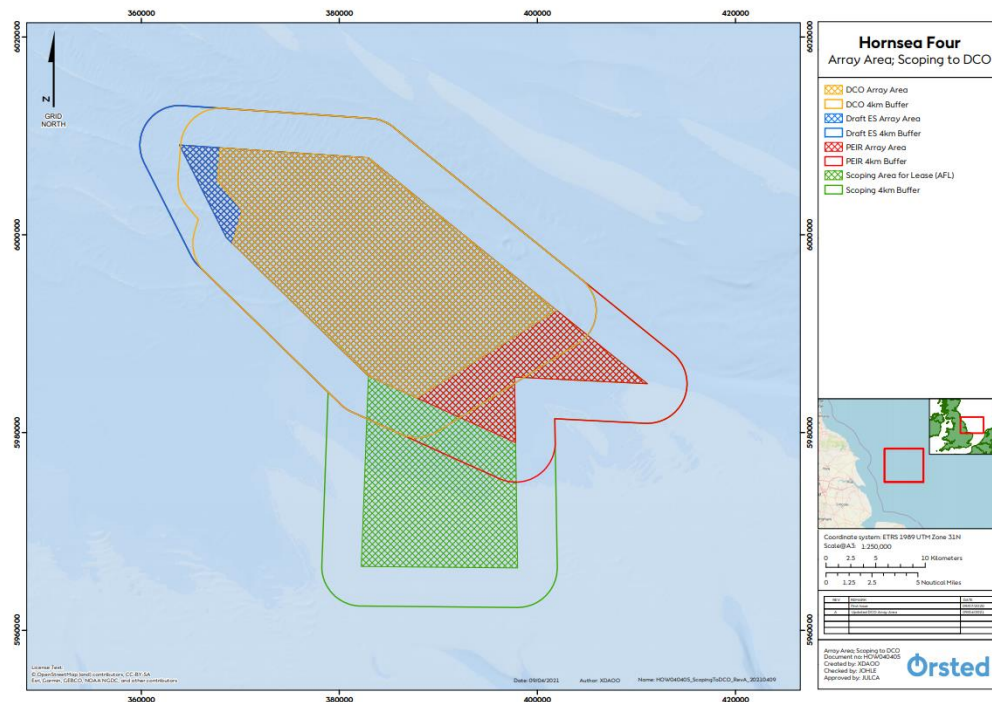


Figure 12-3 Boundaries of the Array Area (and 4km buffer) at different stages of the DCO application process

12.11.1.4 Ornithology was identified as a principal environmental constraint early in the development process due to the relative proximity of the Hornsea Four site to the FFC SPA, hence required detailed consideration through the DAA. The first DAA Biological Workshop (February 2019) resulted in a major site reduction which was determined by the density and distribution of gannet, kittiwake, and guillemot within the Hornsea Four array (as surveyed pre-development). The reduction resulted in ~54% reduction in bird numbers (density of key

species over the 2-year survey period) between what was observed in the original AfL (846 km²) to that reduced AfL (600 km²) Limits.

12.11.1.5 Stakeholder feedback received at Section 42 and 47 consultations lead Hornsea Four to reconsider the commercial impacts upon existing shipping routes and their potential deviations caused by the proposed Hornsea Four array area. In response Hornsea Four undertook additional extensive consultation with the shipping industry and statutory authorities to identify a suitable mitigation solution. The second DAA Human Environment Workshop (February 2019) resulted in a major site reduction which was implemented between Hornsea Two and Hornsea Four, secured through a reduction in the DCO Order Limits, to facilitate the continued safe passage of vessel traffic between the two projects.

12.11.1.6 The final reduction within the north of the AfL was undertaken in an effort to reduce/eliminate the potential for AEol upon the guillemot and razorbill features of the FFC SPA by removing the remaining areas of high auk (guillemots and razorbills) density to the northwest of the AfL and thereby significantly reducing bird numbers within the final development footprint (~7% reduction in the mean peak abundance across all bio-seasons). [Figure 12-4](#)~~Figure 12-4~~~~Figure 12-4~~ presents the predicted density of all auks for the extended breeding season for the entire AfL and the reduced AfL at the point of DCO Application. [Figure 12-4](#)~~Figure 12-4~~~~Figure 12-4~~ clearly demonstrates that in consideration of auks within the extended post-breeding season (the most critical from an assessment and impact perspective) that Hornsea Four has taken significant steps to reduce the impact upon these features via the consideration and implementation of material alternatives that bring

forward a project that has taken due consideration of the environmental sensitivities of the site and designed the proposed project in full recognition of these constraints.

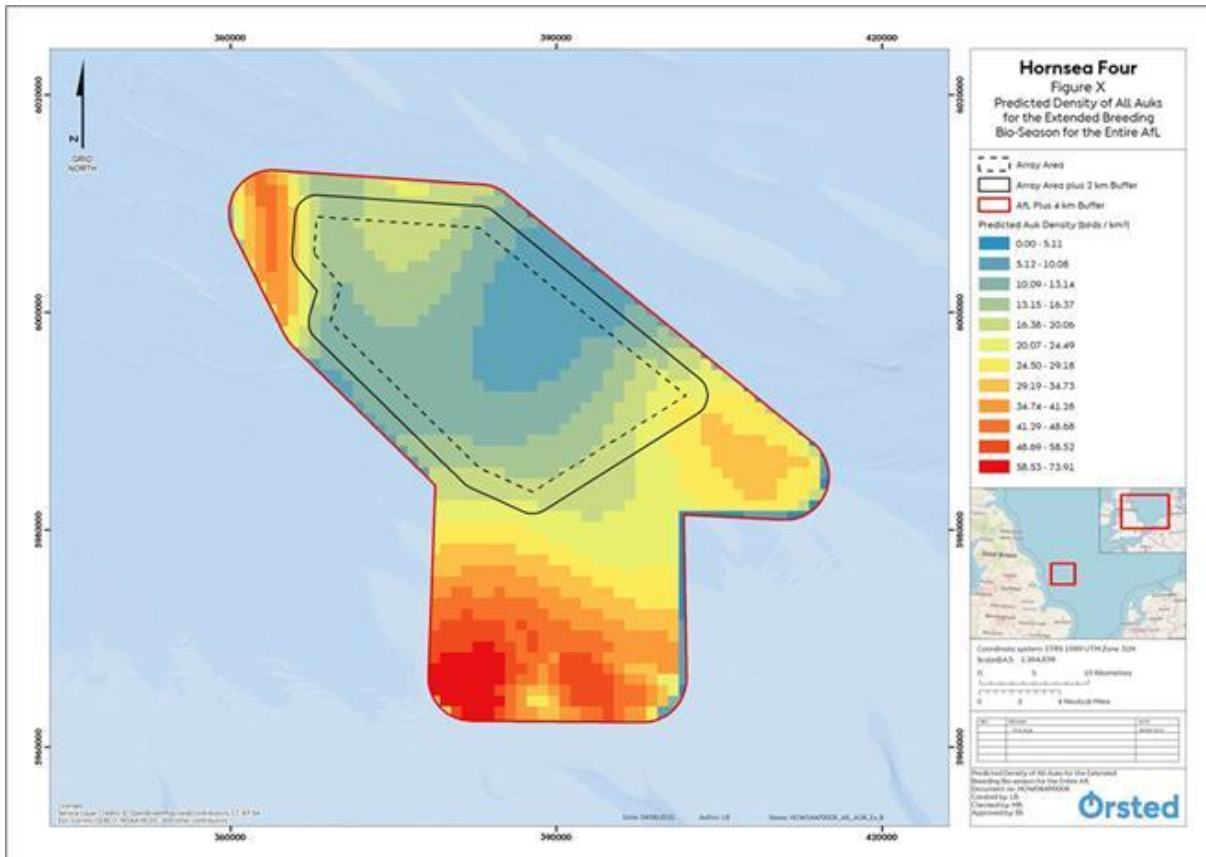


Figure 12-4 Predicted density of all auks for the extended breeding season for the entire AfL and the reduced AfL at the point of DCO Application

12.11.1.7 In addition to the major reduction in the size of the proposed developable area Hornsea Four have avoided the offshore export cable corridor and cable landfall (below MHS) route crossing the offshore extent of the FFC SPA designated site, which extends some kilometres offshore from the FFC cliffs to the east and south. In exploring alternatives, the Applicant has taken meaningful consideration of viable and feasible alternatives while seeking to balance the environmental constraints with the Hornsea Four development potential in time of a “climate emergency”.

12.11.1.8 It is not feasible to further reduce the site developable area without jeopardising the commercial/economic viability of the project and ability to fulfil the project need and objectives. For this reasons, further design modifications are not a feasible alternative and it would not meet Objective Nos. 1, 2, 6-5 and 7-6 (see [Table 10-3](#) ~~Table 10-3~~ ~~Table 10-3~~), in particular they would:-

- Restrict ability to achieve a further decrease in generation cost per MW than those made possible by earlier projects by providing a project that can take advantage of economies

of scale (in context of the greater distance to grid connection and greater distance required to onshore operational and maintenance facilities);

- Materially limit the opportunity for the project to continue to decrease the LCoE over that established in recent CfD auction rounds and therefore limit the Applicant’s ability to be able to put forward a competitive proposition in a future CfD auction rounds;
- Result in suboptimal production due to higher density turbine layout within a reduced array area causing wake loss effects that decrease productivity and thereby increase cost of electricity.; and/or
- Increase risk of a suboptimal array layout or use of supporting offshore infrastructure, inefficient use of export cable capacity and grid connection capacity.

12.11.1.9 Further reduction in the MDS for turbine numbers would also have a potential corresponding reduction in the generation capacity of Hornsea Four. While increase in lower tip height and constraint on rotor swept diameter may not intrinsically reduce capacity, the reduction of turbine numbers would materially reduce the positive impact Hornsea Four will otherwise have in terms of responding to the need for low carbon energy (as established in the NPSs), helping the UK meet its legally binding net zero by 2050 commitment, helping realise the UK government’s ambition of 40GW of offshore wind capacity by 2030 and deliver a cost-effective solution, while maximising the benefits to the UK.

Table 12-1: Assessment of alternative scale, designs and mode of operation and evaluation feasibility of the identified alternatives

Alternative scale, design or mode of operation	Does option meet project need?	Does option meet project objective?	Rationale for need/objective	Is this option feasible?
Reduction in number of turbines	No	No	Would reduce contribution to need and does not meet project Objective Nos. 1, 2, 3, 4, 5 7 and 6 11 (see Table 10-3 Table 10-3 Table 10-3)	No Reduction in the number of turbines is only feasible if a higher capacity turbine (> 14.4MW) was available to fulfil the available grid connection capacity (2.6GW), This is currently not considered to be a feasible option and a reduction in the turbines would therefore reduce the electricity output of the Project and significantly reduce the overall capacity. This would render the Project uncompetitive and therefore economically unfeasible, would not meet the objectives and would risk the project’s

Alternative scale, design or mode of operation	Does option meet project need?	Does option meet project objective?	Rationale for need/objective	Is this option feasible?
				contribution to the 2030 targets.
Minimum tip height (height of turbine blades above sea surface)	Yes	Yes	-	No The project cannot make any further increase in the heights of the lower air draught above 40 m MSL / 42.43 m LAT because the supply chain needed to support higher lift heights associated with larger structures (foundations and towers) does not currently exist. The Applicant is not aware of any existing tower suppliers or wind turbine installation vessels which have the capability to lift blades to heights greater than 40 m MSL on turbines with hub heights above 150 m. To be able to achieve these higher heights, the supply chain needs to be developed further.
Reduction in the developable area	No	No	Further reduction in the developable area would reduce contribution to need and does not meet project Objective Nos. 1, 2, 3 7 and 11 (see Table 10-3 Table 10-3 Table 10-3), because it would: <ul style="list-style-type: none"> Prohibit further decrease in generation cost per MW than those made possible by earlier projects by providing a project that can take advantage of economies of scale (in context of the greater distance to grid 	No Reduction in the developable area would reduce the electricity output of the Project and significantly reduce the overall capacity for the reasons discussed above (e.g. wake loss). This would render the Project not feasible on financial grounds, would not meet the objectives and would risk the project's contribution to the 2030 targets.

Alternative scale, design or mode of operation	Does option meet project need?	Does option meet project objective?	Rationale for need/objective	Is this option feasible?
			<p>connection and greater distance required to onshore operational and maintenance facilities);</p> <ul style="list-style-type: none"> • Materially limit the opportunity for the project to continue to decrease the LCoE over that established in recent CfD auction round and therefore limit the Applicant's ability to be able to put forward a competitive proposition in a future CfD auction rounds; • Increase risk of a suboptimal array layout or use of supporting offshore infrastructure, inefficient use of export cable capacity and grid connection capacity. 	
Operational shutdowns during relevant times	No	No	<p>Would reduce contribution to need and does not meet project Objective Nos. 1, 2, 3 7 and 11 (see Table 10-3 Table 10-3 Table 10-3 Table 10-3 Table 10-3)</p>	<p>No</p> <p>Operational shutdown of turbines would not be feasible because the features of the FFC SPA under consideration do not have distinct and well-established behaviour that would enable shutdown over distinct and brief periods of time. Operational shutdown over extended periods would reduce the electricity output of the Project and significantly reduce the overall capacity. This would render the Project not feasible on financial grounds, would not meet the objectives and</p>

Alternative scale, design or mode of operation	Does option meet project need?	Does option meet project objective?	Rationale for need/objective	Is this option feasible?
				would risk the project's contribution to the 2030 targets.

13 -Step 4: Assessment and Comparative Analysis of Feasible Alternative Solutions

13.1.1.1 Step 4 would involve an assessment and comparative analysis of the relevant impacts of any identified feasible alternatives in respect of European sites comprised in the national site network.

13.1.1.2 As the previous Steps (1 – 3) demonstrate there are no feasible alternatives to Hornsea Four, to Hornsea Four at that location or to the final MDS for Hornsea Four, this Step is therefore not required.

14 Summary and Overall Conclusions on Alternative Solutions

14.1.1.1 The purpose of this section has been to demonstrate objectively to the SoS that there are no feasible alternative solutions to Hornsea Four.

14.1.1.2 [Section 12](#) above summarises the iterative and comprehensive design and mitigation process including a range of potential alternatives discounted by the Applicant during pre-application prior to determining the final MDS for Hornsea Four and summarised in [Table 14-1](#) ~~Table 14-1~~ ~~Table 14-1~~ below. This serves to underline the exhaustive design process which underpins the final MDS for Hornsea Four.

14.1.1.3 Against that background, a total of a further 18 potential alternative options have been considered and discounted for the reasons set out in [Section 12](#) to [Section 13](#) above, as summarised in [Table 14-1](#) ~~Table 14-1~~ ~~Table 14-1~~ below.

Table 14-1: Summary of potential alternative options discounted for Hornsea Four.

Category	Alternative option considered	Reason for which alternative option was discounted
Do Nothing (Section 12.2)	Not progressing Hornsea Four	Does not meet project need and does not deliver all of the project objectives.
Alternative Locations (Section 12.3 to Section 12.9)	Array located not in the UK EEZ	Does not meet project need and does not deliver all of the project objectives.
	Array located outside former Hornsea Zone	Does not meet project need and does not deliver all of the project objectives (and no evidence this would avoid impacts on European sites).

Category	Alternative option considered	Reason for which alternative option was discounted
	Array located elsewhere in former Hornsea Zone	Does not meet project Objective Nos. 54 and 56 and would not avoid impacts on European sites.
Other scales or designs or methods of construction (Section 12.10)	Reduction in number of turbines	Reduction in the number of turbines would reduce the electricity output of the Project and significantly reduce the overall capacity. This would render the Project uncompetitive and therefore economically unfeasible, would not meet the objectives and would risk the project's contribution to the 2030 targets.
	Reduction in the developable area	Reduction in the developable area would reduce the electricity output of the Project and significantly reduce the overall capacity for the reasons discussed above (e.g. wake loss). This would render the Project not feasible on financial grounds, would not meet the objectives and would risk the project's contribution to the 2030 targets.
	Increase lower blade tip height above 42.43 m LAT, and rotor diameter	Not feasible (technical and financial grounds).
Other Means of Operating / Timing (Section 12.10)	Turbine shutdown during relevant seasons	Operational shutdown of turbines would not be feasible because the features of the FFC SPA under consideration do not have distinct and well-established migratory behaviour over a brief period of time. Therefore, shutdown would be required for extended periods which would reduce the electricity output of the Project and significantly reduce the overall capacity. Would reduce contribution to need and does not meet project Objective Nos. 1, 2, 3, 4, 5 7 and 611 (see Table 10-3 Table 10-3 Table 10-3) Not feasible (financial grounds).

14.1.1.4 The consideration of alternative solutions must be approached on a reasonable basis, with reference to the genuine project objectives designed to serve the identified need. Each stage/ step must be grounded in real world considerations of feasibility (legally, technically, and commercially). With that in mind, the Applicant has undertaken a comprehensive analysis of potential alternative options which is considered sufficient to enable the SoS to be objectively satisfied as to the absence of any feasible alternative solutions to Hornsea Four.

14.1.1.5 In this context it is relevant and reasonable for the SoS to have regard to and place weight on the experience and expertise of the Applicant in offshore wind development. Orsted is a world leading offshore wind developer with around 30 years' experience in successful

offshore wind deployment. Orsted has built more offshore wind farms than any other developer in the world. Globally, Orsted has installed 7.6 GW of offshore wind capacity, with a further 2.3 GW under construction and a pipeline of projects in development⁶⁸. In December 2020, Orsted was granted consent to develop a new offshore wind farm (Hornsea Three) with a capacity of at least 2.4GW. Orsted have offshore wind farms in the US, Taiwan and across Europe, in Denmark, Germany, the UK and The Netherlands. The UK is Orsted's largest market, with 12 operational wind farms⁶⁹ and another, Hornsea Project Two, under construction. These 12 offshore wind farms have a combined capacity of 4.9 GW and produce enough green electricity to power 3.2 million UK homes⁷⁰. By 2022, this figure will increase to 5.5 million UK homes.

14.1.1.6 The final MDS for Hornsea Four is informed by expert judgement and market leading expertise, with current knowledge of the realities and challenges of construction in the marine environment. The Applicant believes that the vast experience Orsted holds in offshore wind delivery globally should give the SoS confidence that the Applicant has considered all feasible options to avoid or reduce harm to European sites whilst ensuring a viable and deliverable project.

⁶⁸ See: [Our Offshore Wind Farms | Orsted](#)

⁶⁹ Barrow OWF, Burbo Bank OWF, Burbo Bank OWF Extension, Gunfleet Sands OWF, Hornsea 1, Lincs, London Array OWF, Race Bank OWF, Walney OWF, Walney OWF Extension, West of Duddon Sands, Westernmost Rough OWF.

⁷⁰ Based on a UK installed capacity of 3.7GW applying BEIS five-year average load factor of 38.6%, a household consumption figure of 3,828kWh per year and 27.2 million UK households.

Part 3: Imperative Reasons of Overriding Public Interest

15 Introduction to Imperative Reasons of Overriding Public Interest

15.1.1.1 The Habitat Regulations Assessment (HRA) Derogation Provisions provide that a project having an Adverse Effect on Integrity (AEol) on a European site may proceed (subject to a positive conclusion on alternatives and provision of any necessary compensation) if the project must be carried out for reasons of imperative reasons of overriding public interest (IROPI) that justify the project despite the environmental damage it may cause.

15.1.1.2 **Part 3** of the without prejudice derogation case is provided to demonstrate that the Secretary of State (SoS) can be satisfied that there are IROPI for Hornsea Four, should the SoS conclude any AEol in respect of the Flamborough and Filey Coast Special Protection Area (FFC SPA).

15.1.1.3 This part of the document (Report to Demonstrate IROPI) sets out a compelling case that Hornsea Four must be carried out for IROPI in view of its social and economic benefits, which align with (and are needed to achieve) United Kingdom’s (UK) Government policy aspirations and legal commitments.

15.1.1.4 The case submitted demonstrates that Hornsea Four can substantially contribute to the UK’s legally binding climate change targets by helping to decarbonise the UK’s energy supply, whilst also contributing to the essential tasks of ensuring security of supply and providing low-cost energy for consumers in line with the UK government’s national policies. Hornsea Four will also provide substantial employment opportunities and skills development, particularly in coastal communities, whilst also playing a major role in supporting the UK’s supply chain.

15.2 Content and Structure of Part 3

15.2.1.1 The IROPI information in this Part of the report is structured as set out in [Table 15-1](#) ~~Table 15-1~~ ~~Table 15-1~~ below.

Table 15-1: Structure of the IROPI Case in Part 3 of this report.

Section title	Section in report	Section content
Hornsea Four IROPI case	Section 16	Consideration of the scope of the IROPI.
	Section 16	Imperative: demonstration of the urgency and importance of Hornsea Four.
	Section 16	Public interest: The interest must be a public rather than a solely private interest (although a private interest can coincide with delivery of a public objective).
	Section 16	Long-term interest: demonstration of the long-term nature of the interests that Hornsea Four will serve.
	Section 16	Overriding: demonstration of the public interest balance weighing in favour of Hornsea Four in the context of its impacts on the FFC SPA.

Section title	Section in report	Section content
IROPI conclusion	Section 17	The final conclusion that there are IROPI to support Hornsea Four.

16 Legislative and Policy Context for IROPI

16.1 The Scope of IROPI

16.1.1.1 The HRA Derogation Provisions identify certain in-principle grounds of IROPI that may be advanced in favour of said project, although these are not exhaustive and other IROPI grounds may be relied upon. There are restrictions on IROPI grounds for impacts to priority habitat or species unless the matter is subject to a further opinion⁷¹. In the case of Hornsea Four, SPAs classified under the Birds Directive do not identify priority habitat types or priority species.

16.1.1.2 Therefore, the IROPI which can be considered for Hornsea Four are unconstrained, and can include:

- The core IROPI of human health, public safety and beneficial consequences of primary importance for the environment;
- IROPI of a social or economic nature; and
- Any other IROPI.

16.1.1.3 The parameters of IROPI are explored in DEFRA 2012 and MN 2000, which identify the following principles:

- **Imperative – Urgency and importance:** There would usually be urgency to the objective(s) and it must be considered "indispensable" or "essential" (i.e. imperative). In practical terms, this can be evidenced where the objective falls within a framework for one or more of the following:
 - I. actions or policies aiming to protect fundamental values for citizens' life (health, safety, environment);
 - II. fundamental policies for the State and the Society; or
 - III. activities of an economic or social nature, fulfilling specific obligations of public service.
- **Public interest:** The interest must be a public rather than a solely private interest (although a private interest can coincide with delivery of a public objective).
- **Long-term:** The interest would generally be long-term; short-term interests are unlikely to be regarded as overriding because the conservation objectives of the Habitats and Birds Directives are long term interests.
- **Overriding:** The public interest of development must be greater than the public interest of conservation of the relevant European site(s).

⁷¹ Post-Brexit the requirement to seek the opinion of the EC has been removed. Where the decision-maker is the SoS, there is no requirement to obtain a further opinion from another body.

16.1.1.4 The parameters of IROPI are further established in the context of the recent Decision on (Dec 31st, 2020) Hornsea Three⁷² for which the SoS was satisfied there are IROPI for the Development to proceed (subject to adequate compensatory measures (para 6.35)).

16.1.1.5 The SoS reviewed the public benefit of the project (which was deemed to be “essential and urgent”) and the principal and essential benefit which was classified as a “significant contribution to limiting the extent of climate change.” The need to make this contribution within the timeframe required (and the mechanisms governed by TCE) was further highlighted (paragraph 6.42). The nature of the project, its location and predicted impacts on the FFC SPA (kittiwake) make the case highly applicable to Hornsea Four.

16.2 The Global Imperative – (“Actions to protect fundamental values for citizens’ life: health, safety, environment”)

16.2.1.1 Climate change is the defining challenge of our time. The impacts of climate change are global in scope and unprecedented in human existence. The science linking the concentration of greenhouse gas emissions to average global temperature on Earth is unequivocal. The climate stability that has enabled humans to prosper is now at risk.⁷³ This has been highlighted by the Sixth Assessment Report published recently by the Intergovernmental Panel on Climate Change (IPCC)⁷⁴. This report highlighted amongst other things that it is unequivocal that human influence has warmed the atmosphere, ocean and land and that widespread changes in the atmosphere, ocean, cryosphere, and biosphere have occurred.

16.2.1.2 The direct and indirect consequences of climate change, which include extreme weather events (flooding, heat waves and droughts), species extinctions and ecosystems collapse⁷⁵ all threaten the health, safety, and environment of global citizens. For example, by hindering food production, water resources and putting lives and settlements at risk (as described in [Table 16-1](#)~~Table 16-1~~~~Table 16-1~~ below).

16.2.1.3 The UK government recognises that people are already experiencing some impacts and that those impacts will become more severe and widespread as global temperatures rise⁷⁶. The measure of the impacts citizens experience depends upon how successfully greenhouse gas emissions can be reduced. The IPCC has stressed that global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO₂ and other greenhouse gas emissions occur in the coming decades⁷⁷.

16.2.1.4 With the potential to generate an estimated 2.6GW, Hornsea Four will deliver a substantial, near-term contribution to Great Britain’s (GB) decarbonisation objectives and security of

⁷² Department for Business, Energy & Industrial Strategy – Letter from the SoS to Orsted (the Applicant) dated 31 December 2020 regarding the application for Hornsea Project Three (UK) Limited. See [link](#).

⁷³ Reducing emissions and preparing for climate change: 2017 Report to Parliament Summary and recommendations Committee on Climate Change June 2017.

⁷⁴ Sixth Assessment Report. IPCC 9th August 2021. Headline Statements from the Summary for Policymakers https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Headline_Statements.pdf

⁷⁵ Gov.uk Guidance – Guidance ‘Climate change explained’ 25 July 2019. Accessed [here](#)

⁷⁶ Gov.uk Guidance – Guidance ‘Climate change explained’ 25 July 2019. Accessed [here](#)

⁷⁷ Climate Change 2021. The physical Science Basis. Summary for Policymakers. Sixth Annual Report of the IPCC 9th August 2021. https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf

supply and will significantly help to reduce the UK's greenhouse gas emissions, by offsetting millions of tonnes of carbon dioxide (CO₂) emissions per annum. More detail is provided in the sections below (e.g., [Section 16.5](#), [Section 16.5.2](#) and [Section 16.5.6](#)).

16.2.1.5 In the Hornsea Three Decision⁷⁸, the SoS determined that the consequences of not contributing to the objective of limiting the extent of climate change would be "severely deleterious to societies across the globe, including the UK, to human health, to social and economic interests and to the environment" (paragraph 6.37).

16.3 The UK Context ("Fundamental policies for the State and the Society")

16.3.1.1 The UK has demonstrated global leadership on climate change. It has in place a comprehensive set of measures to reduce greenhouse gas emissions through investment in renewables. Recent enhancements of UK government policy and legislation to tackle climate change provide unequivocal evidence that the objectives of Hornsea Four fall within a framework of fundamental policies for the state (and the society it serves).

16.3.1.2 In July 2019, the UK became the first major economy to legally commit to reducing its greenhouse gas emissions to net zero by 2050⁷⁹. In their 2019 Report⁸⁰, the UK's CCC advise that consistently strong deployment of low-carbon generation in the lead up to 2050 will be required to meet net zero, including "...at least 75GW of offshore wind."⁸¹In the most recent CCC report⁸², the CCC emphasise that in order to achieve Net Zero there is a required *"a rapid scale up in low carbon investment.....and speed up the delivery which will need to accelerate even where ambition is broadly on track. For example, although the Government's 2030 target for offshore wind is in line with the CCC pathway, a minimum of 4 GW of additional offshore wind capacity will be needed each year from the mid-2020s onwards, significantly greater than the current 2 GW per year"*.

16.3.1.3 The adoption of a net zero by 2050 commitment requires a substantial reduction in the carbon emissions from transport and heat. This in turn is expected to create a substantial additional demand for low-carbon electricity in the 2030s and 2040s. This additional demand places a new urgency on the development of new and additional sources of low-carbon electricity that must be established in the 2020s in order to meet the UK governments carbon budgets out to 2050.

16.3.1.4 In the Ten Point Plan for a Green Industrial Revolution, the UK government states its ambition to quadruple the UK's installed offshore wind capacity over the next decade to 40GW by 2030, up from the 30GW target in the Offshore Wind Sector Deal, launched in March 2019. This pledge represents a quadrupling of the UK's installed offshore wind capacity within the next decade and reflects Government's aim to accelerate its journey in order to deliver net zero greenhouse gas emissions. As set out in [Part 2](#), the development of

⁷⁸ Department for Business, Energy & Industrial Strategy – Letter from the SoS to Orsted (the Applicant) dated 31 December 2020 regarding the application for Hornsea Project Three (UK) Limited. See [link](#).

⁷⁹ The Climate Change Act 2008 (2050 Target Amendment) Order 2019

⁸⁰ Committee on Climate Change. Net Zero Technical Report. 2019 (CCS Net Zero report).

⁸¹ CCS Net Zero report at page 191.

⁸² CCC Progress in Reducing Emissions. 2021 Report to Parliament. June 2021. Available [here](#)

large-scale offshore wind farms typically takes in the region of 8 years +. Projects that are not consented, in planning or well-advanced are unlikely to contribute by 2030.

16.3.1.5 Without Hornsea Four, it is very possible that delivery of the Sector Deal, the UK government's Ten Point Plan and the UK government's 2030 ambition would fall short. Offshore wind is recognised as being an important technology for low-carbon generation and the urgent need for large capacities of low-carbon generation is clear to avoid compromising security of electricity supply. Specifically, Hornsea Four will be a necessary part of the future generation mix, and as such will make a valuable contribution in the direction of adopted UK government policy and achievement of decarbonisation commitments.

16.3.1.6 In the Hornsea Three Decision⁸³, the SoS references the UK's international commitments on climate change to define the principal and essential benefit of the project. These are delivered through the Climate Change Act 2008, the National Policy Statements (NPS) for energy (EN-1), renewable energy infrastructure (EN-3) and electricity networks (EN-5).

16.4 The Clear and Urgent Need for Hornsea Four

16.4.1.1 The fundamental importance of and need to urgently deliver Hornsea Four is therefore clear and demonstrable. It flows from the important and urgent requirement to deliver significant volumes of renewable energy generating capacity to meet the UK's legally binding net zero by 2050 commitment in response to the latest climate science and, in turn, from the size of the contribution expected from offshore wind, as confirmed by the Government's commitment: 40GW of offshore wind by 2030.

16.4.1.2 The need for significant quantities of offshore wind is already well-established in the relevant National Policy Statements (NPS) (EN-1 and EN-3) which pre-date the more recent commitments. Since the NPSs were published in 2011, there have been significant developments to UK energy and climate policy. Recent enhancements of existing UK government policy on climate change and the development of offshore wind (not referenced above) include:

- A highly competitive Contracts for Difference (**CfD**) allocation round in 2019 to accelerate the deployment of offshore wind, with costs falling by two thirds in the last five years;
- The European Commission's 2030 Climate Target Plan published in September 2020⁸⁴ which sets a more ambitious and cost-effective path to achieving climate neutrality by 2050;
- The Energy White Paper Powering our Net Zero Future Presented to Parliament by the SoS in December 2020 that set out measures to support the development of offshore wind. These include funding for manufacturing infrastructure and the Offshore

⁸³ Department for Business, Energy & Industrial Strategy – Letter from the SoS to Orsted (the Applicant) dated 31 December 2020 regarding the application for Hornsea Project Three (UK) Limited. See [link](#).

⁸⁴ security of supply is maintained." 5https://ec.europa.eu/clima/policies/eu-climate-action/2030_ctp_en#:text=With%20the%202030%20Climate%20Target,target%20of%20at%20least%2040%25

Renewable Energy Catapult project to serve as a leading testing facility for the development of technologies; and

- The reaffirming of the 40GW by 2030 ambition on 18 November 2020 by the Government's 'Ten Point Plan for a Green Industrial Revolution'⁸⁵.

16.4.1.3 The energy industry has also continued to evolve with the cost of many key technologies falling significantly, which the CCC note is an indication of "...major changes to what is possible...". There is now an even greater urgency for offshore wind generation, particularly large projects like Hornsea Four which are deliverable in the late-2020s, given announcements made in 2019 relating to nuclear deployment in the UK. Offshore wind is now one of the lowest cost forms of energy and one that can be deployed at scale within relatively short timeframes. It is essential to meet the Government's decarbonisation, security of supply and affordability policies.

16.4.1.4 The Development Consent Order (DCO) Application is accompanied by a Statement of Need (**Volume F1, Chapter 6: Statement of Need**) which is summarised in **Section 10** (the need case). This document demonstrates that the deployment of offshore wind, and specifically Hornsea Four is needed to make a significant contribution to the following UK Government's national policy aims of decarbonisation:

- Net-zero and the importance of deploying zero-carbon generation assets at scale;
- Security of supply (geographically and technologically diverse supplies); and
- Affordability.

16.4.1.5 As detailed in the Statement of Need (**Volume F1, Chapter 6: Statement of Need**) and **Section 10**), wind generation is economically and technically preferential, to the GB electricity consumer for the following reasons:

- Decarbonisation is a UK legal requirement and is of global significance. It cannot be allowed to fail, and urgent actions are required in the UK and abroad, to keep decarbonisation on track to limit global warming;
- Wind generation is an essential element of the delivery plan for the urgent decarbonisation of the GB electricity sector. This is important not only to reduce power-related emissions, but also to provide a timely next-step contribution to a future generation portfolio which is capable of supporting the decarbonisation of transport and heat sectors, through electrification;
- As part of a diverse generation mix, wind generation contributes to improve the stability of capacity utilisations among renewable generators. By being connected at the transmission system level, large-scale offshore wind generation can and will play an important role in the resilience of the GB electricity system from an adequacy and system operation perspective;
- Internationally, and importantly, GB is leading in this regard, offshore wind generation assets are becoming bigger and cheaper, each subsequent project providing a real-life demonstration that size and scale works for new offshore wind, and providing benefits to consumers in the process. Other conventional low-carbon generation (e.g. tidal, nuclear

⁸⁵ <https://www.gov.uk/government/news/pm-outlines-his-ten-point-plan-for-a-green-industrial-revolution-for-250000-jobs>

or conventional carbon with CCUS) remain important contributors to achieving the 2050 Net-Zero obligation, but their contributions in the important 2020s is likely to be low;

- Offshore wind is already super-competitive against other forms of conventional and low-carbon generation, both in GB and more widely.

16.4.1.6 Hornsea Four specifically offers the following benefits:

- The Hornsea Four development proposes a substantial infrastructure asset, capable of delivering large amounts of low-carbon electricity – enough to power in excess of 2m homes each year, from as early as the late 2020s. This is in line with the CCC’s recent identification of the need for urgent action to increase the pace of decarbonisation in the GB electricity sector;
- Hornsea Four’s connection to the NETS means that it will be required to play its part in helping National Grid Electricity System Operator (ESO) manage the national electricity system. This includes participating in mandatory balancing markets (to help balance supply and demand on a minute-by-minute basis and provide essential ancillary services) as well as providing visibility to the GB power market of its expected generation. This means that the low marginal cost wind power it will produce, can be forecast and priced into future contracts for power delivery by all participants, thus allowing all consumers to benefit from the market-price reducing effect of low-marginal cost offshore wind generation;
- Benefit of including permission to develop integration technology as part of the onshore infrastructure; and
- Maximising the capacity of generation in the resource-rich, accessible, and technically deliverable former Hornsea Zone, is to the benefit of all GB consumers, and the wind industry generally.

16.4.1.7 As concluded in the Statement of Need ([Volume E1, Chapter 6: Statement of Need](#)), Hornsea Four can make a large, meaningful, and timely contribution to decarbonisation and security of supply, while helping lower bills for consumers throughout its operational life, thereby addressing all important aspects of the UK’s legal obligations and existing and emerging UK government policy. The case for Hornsea Four is urgent and important.

16.5 A clear public interest

16.5.1.1 There is a clear public interest in Hornsea Four proceeding. That flows from its unique ability to provide a substantial contribution in the late 2020s towards the achievement the UK government’s national policies, which demand the urgent decarbonisation, ensuring security of supply and affordability discussed above.

16.5.1.2 DEFRA 2021b⁸⁶ advises that the NPSs and other documents setting out UK government policy (e.g., the UK Renewable Energy Roadmap) provide a context for competent authorities in considering the HRA Derogation Provisions and that projects which enact or

⁸⁶ Defra Guidance Habitats regulations assessments: protecting a European site. 24 February 2021. Available [here](#)

are consistent with national strategic plans or policies (e.g., such as those provided for in NPS EN-1 and EN-3) are more likely to show a high level of public interest.

16.5.1.3 Hornsea Four is consistent with and enacts important national policy as demonstrated in the sections above.

16.5.1.4 It is further noted that in the determination of Hornsea Project Three, the SoS found that the project will provide an essential public benefit (para 6.36) in terms of the delivery of renewable energy.

16.5.2 Combatting climate change

16.5.2.1 The public interest in Hornsea Four goes further than meeting legal and policy targets. Hornsea Four could be instrumental in combating climate change and the threats it poses to human beings and the environment (including seabirds). The health and well-being of our species, and the future of our planet, depends on the rapid deployment of renewable resource such as, and including, Hornsea Four.

16.5.2.2 The most recent climate change risk assessment for the UK published by the UKs CCC⁸⁷ highlights a series of risks to the UK from climate change. 61 risks and opportunities were identified in the report and many of these risks could be combatted by the deployment of large-scale offshore wind resource such as, and including, Hornsea Four. A list of some of the risks which Hornsea Four could help combat are presented in [Table 16-1](#)~~Table 16-1~~~~Table 16-1~~.

Table 16-1 A selection of some of the risks identified in the CCRA3 Technical Report (CCC, 2021) that Hornsea Four could help combat.

Risk number	Description
Natural Environment and Assets	
N1	Risks to terrestrial species and habitats from changing climatic conditions and extreme events, including temperature change, water scarcity, wildfire, flooding, wind, and altered hydrology (including water scarcity, flooding and saline intrusion).
N4	Risk to soils from changing climatic conditions, including seasonal aridity and wetness.
N5	Risks and opportunities for natural carbon stores, carbon sequestration from changing climatic conditions, including temperature change and water scarcity
N6	Risks to and opportunities for agricultural and forestry productivity from extreme events and changing climatic conditions (including temperature change, water scarcity, wildfire, flooding, coastal erosion, wind, and saline intrusion).
N14	Risks to marine species, habitats, and fisheries from changing climatic conditions, including ocean acidification and higher water temperatures
Infrastructure	
I2	Risks to infrastructure services from river, surface water and groundwater flooding

⁸⁷ Betts, R.A. and Brown, K. (2021) Introduction. In: The Third UK Climate Change Risk Assessment Technical Report [Betts, R.A., Haward, A.B. and Pearson, K.V. (eds.)]. Prepared for the Climate Change Committee, London

Risk number	Description
I3	Risks to infrastructure services from coastal flooding and erosion
I4	Risks to bridges and pipelines from flooding and erosion
I10	Risks to energy from high and low temperatures, high winds, lightning
I11	Risks to offshore infrastructure from storms and high waves
Health, Communities, and the Built Environment	
H1	Risks to health and wellbeing from high temperatures
H3	Risks to people, communities, and buildings from flooding
H4	Risks to the viability of coastal communities from sea level rise
Business and Industry	
B1	Risks to businesses from flooding
B2	Risks to businesses and infrastructure from coastal change from erosion, flooding and extreme weather events
B3	Risks to business from water scarcity

16.5.2.3 Hornsea Four will be located in the southern North Sea. Centre for Environment, Fisheries and Aquaculture Science (CEFAS) data⁸⁸ describes a significant long-term warming trend (by around 2°C) in the North Sea over the past century, which is significantly faster than the rate of warming of global oceans. Our understanding of the effects of warming on the physical processes and ecology of the North Sea continues to advance.

16.5.2.4 It is relevant to note, as the Applicant has prepared this ~~without prejudice~~ derogation case ([without prejudice for guillemot, razorbill and gannet](#)) in part for effects on the kittiwake feature of the FFC SPA, that kittiwake is a species evidenced to be more sensitive to climate change than other seabirds. By way of example, climate change has been linked with an 87% decline in breeding kittiwakes on Orkney and Shetland, and by 96% at St Kilda since 2000⁸⁹. This is in comparison with a predicted reduction in the annual growth population growth rate of 0.48% due to in-combination OWF collision risk mortality (see [Section 6.2](#)).

16.5.2.5 Recent research by Marine Scotland (2019) describes the observed impact of increases in sea surface temperature on abundance of sandeel, which is a key prey species for seabird species including kittiwake, puffin,⁹⁰ guillemot⁹¹ and razorbill⁹². Sadykova et al (2020)⁹³ predict significant spatial shifts in a number of UK predator prey relationships by 2050,

⁸⁸ <https://www.cefas.co.uk/impact/case-studies/130-years-of-measuring-seawater-temperature/>.

⁸⁹ RSPB, 2017: Kittiwake joins the red list of birds facing risk of global extinction. Accessed at: <https://www.rspb.org.uk/about-therspb/about-us/media-centre/press-releases/kittiwake-joins-the-red-list-of-birds-facing-risk-of-global-extinction/>

⁹⁰ Régnier, T., Gibb, F.M. & Wright, P.J. Understanding temperature effects on recruitment in the context of trophic mismatch. *Sci Rep* 9, 15179 (2019) doi:10.1038/s41598-019-51296-5.

⁹¹ ELIFONTS project (Effect of Large-scale Industrial Fisheries On Non Target Species) multi-disciplinary collaboration between the Sea Mammal Research Unit (UK), Fisheries Research Services (UK), the Danish Institute for Fisheries Research, the Institute for Terrestrial Ecology (UK), and the University of Newcastle-upon-Tyne (UK) See: [link](#)

⁹² Daunt F., Wanless, S., Greensheet, H. Jensen., Hamer, K.C, Harris, M.P The Impact of the Sandeel fishery closure on seabird food consumption, distribution, and productivity in the northwest North Sea. See [link](#)

⁹³ Ecological costs of climate change on marine predator-prey population distributions by 2050 Dinara Sadykova^{1,2} | Beth E. Scott¹ | Michela De Dominicis³ | Sarah L. Wakelin³ | Judith Wolf³ | Alexander Sadykov^{1,2,4}.

including kittiwake/sandeel, guillemot/herring, grey seal/sandeel, with all but one model showing significant decreases overall.

16.5.2.6 This research demonstrates that the likely effect of climate change will be further declines of these seabird species within the North Sea due to a failure of prey populations.

16.5.2.7 Habitats vulnerable to climate change that are not adversely impacted by Hornsea Four will benefit from climate change mitigation which low carbon generation provides. This demonstrates that climate change mitigation including low carbon generation is an essential part of protecting the coherence of the UK MPA network.

16.5.3 Socioeconomic Benefits

16.5.3.1 The public interest in Hornsea Four goes further still and includes substantial economic benefit to the UK and its regions. Hornsea Four is capable of providing substantial benefits to the UK economy including facilitating confidence in the UK supply chain, growing a skilled workforce and providing wider community benefits. Whilst economic benefit will be accrued from Hornsea Four, it is recognised that the precise magnitude of these benefits will be influenced by the selection of the construction and operation ports, as outlined in the subsequent sections, and detailed in the socioeconomic assessment ([Volume A3, Chapter 10: Socio-economics](#)).

16.5.3.2 The Application includes a socio-economic assessment of the potential benefits of Hornsea Four. The information provided in this section is drawn from [PEIR Volume 3, Chapter 10: Socio-economics](#) and also [ES Volume A3, Chapter 10: Socio-economics](#). The assessment of socio-economic effects concludes ([ES Volume A3, Chapter 10: Socio-economics](#)) that Hornsea Four will have significant beneficial effects on enabling local residents to access employment opportunities through construction activities within the local economic development study area (former Humber LEP).

16.5.1 Employment

16.5.1.1 There are several specialisms within the Humber LEP's employment base which position the area well to benefit from Hornsea Four. The area shows specialisms within several manufacturing subsectors, including fabricated metal production and manufacturing of wires and devices.

16.5.1.2 During construction, across the UK the potential employment ranges from 3,600 and 25,100 person years of employment (direct employment) under the low and high construction impact scenarios respectively. This includes the direct and supply chain employment impacts. In annual terms, the construction phase of Hornsea Four could support between 800 and 5,600 Full Time Employees (FTEs) under the low and high scenarios respectively⁹⁴.

[16.5.1.3](#) During construction, Hornsea Four will inevitably draw some of its labour from outside of the local economic development study area, however it is reasonable to expect that some new employment opportunities will be created locally and could be taken up by people living in

⁹⁴ ; Build period is assumed to be 4.5 years

the study area considered. The employment impact under the Humber and East Yorkshire (HEY) Port scenario has the potential to deliver a reduction in the baseline number of residents seeking employment (see

Table 16-3

~~16.5.1.3~~16.5.1.4 ~~Table 16-3~~Table 16-3). The extent to which these employment opportunities will result in reductions to the number of claimants depends on the extent to which local people can access the employment. This is linked to the skills of local residents and the information and support provided to enable them to access the jobs. It should be noted that the higher number of jobs created under the HEY Port scenario is likely to include a greater number of people that are brought into the area from outside given the temporary nature of the employment opportunities.

~~16.5.1.4~~16.5.1.5 The Applicant aims to work with local partners to maximise the ability of local people to access employment opportunities associated with the construction and operation of the project.

Table 16-2 Predicted impact of employment impact for residents.

Study Area	Scenario	Average Annual Employment Impact (FTE Jobs)	Number of Claimants	Impact as % of Baseline Indicator
Local Study Area (Former Humber LEP)	HEY Port	1600	37,200	4.3%
	Non-HEY UK Port	200		0.54%
	Non-UK Port	100		0.3%

Note: Figures may not sum due to rounding; Build period is assumed to be around 4.5 years.

~~16.5.1.5~~16.5.1.6 The assessment in the ES of the operation and maintenance (O&M) phase (reported in **Table 10.16 (Predicted impact of employment impact for residents)** in **ES Volume A3, Chapter 10: Socio-economics**) concludes that the potential employment impact could be 200 FTE using the HEY Port scenario with <50 FTE under a non-HEY UK Port scenario.

~~16.5.1.6~~16.5.1.7 It is noted that the assessment of employment and Gross Value Added (GVA) benefits in **PEIR Volume A3, Chapter 10: Socio-economics** only includes direct and indirect effect and does not include induced effects (or 'personal expenditure'), associated with the expenditure of employment incomes by the workforce. This would support further large-scale employment in the Humber LEP area and across the UK across a range of mainly service sectors including hospitality, restaurants, and the retail sector.

~~16.5.1.7~~16.5.1.8 Given the history of offshore wind supply chains in the Humber LEP and the prominence of the manufacturing sector, there may be opportunities for businesses across several sectors to benefit from the construction and O&M activities from Hornsea Four. Several sectors have the potential to be impacted by construction and O&M including construction and engineering sectors including manufacturing (non-engineer), construction, land-based transport, engineering, energy generation and marine transport.

~~16.5.1.8~~[16.5.1.9](#) Hornsea Four can provide a substantial contribution to establishing and maintaining a skilled workforce in the UK with the associated economic benefits (direct and indirect) that brings.

16.5.2 Supply Chain Capacity and Capability

16.5.2.1 The Humber LEP's local economic development study area has been able to benefit from several offshore wind developments in recent years, building on its existing industry strengths and further capabilities. There are a number of major businesses established in the Humber that are involved in offshore wind developments. These include Siemens and its blade manufacturing facility in Hull; REDS Maritime providing cable remediation and support services; GEV Wind Power – a turbine maintenance company, and other key energy players such as Centrica, Total and BP (Renewable UK 2016).

16.5.2.2 The £310m investment by Siemens Gamesa and ABP at Green Port Hull presents a significant opportunity for the sector locally, with the wind turbine installation and production plant currently employing around 1,000 people. This presents a significant opportunity to retain supply chain expenditure that is often sourced for UK wind farms from outside of the UK (Siemens, 2017).

16.5.2.3 The local study area has also gained recognition nationally within the sector with The Offshore Renewable Energy Catapult and Offshore Wind Industry Council's Prospectus referencing the Humber LEP as a successful example of creating long-term highly skilled jobs locally and establishing a supply chain (Offshore Renewable Energy Catapult & Offshore Wind Industry Council, 2018).

16.5.2.4 A report for Energy & Utility Skills on the skills and labour requirements of the offshore wind industry estimates that direct employment in the sector could increase from 10,000 in 2017 to 36,000 in 2032, nationally (Energy & Utility Skills, 2018). An increase of 26,000 jobs, 5,750 of which are expected to be in the Yorkshire & Humber region.

16.5.2.5 Orsted has an established presence in the Humber. Its operations and maintenance hub in Grimsby was initially established to support the Westermost Rough offshore wind farm in 2013. Orsted has significantly invested and expanded this site which now operates this as the "East Coast Hub" serving Westermost Rough, Lincs, Race Bank, Hornsea One and Hornsea Two offshore wind farms. There are around 400 people working from the East Coast Hub, with approximately 85% of these coming from within a one-hour drive time.

16.5.3 Investment

[16.5.3.1](#) During the construction phase, three scenarios were considered in the socio-economic assessment undertaken for PEIR (low, medium, and high) for the Humber region (LEP area) and the UK study area. Although precautionary and conservative, the socio-economic assessment concluded the impacts reported in

Table 16-3

~~16.5.3.1~~16.5.3.2 ~~Table 16-3~~**Table 16-3.**

Table 16-3 Conclusions from the Socio-economic Assessment (Summary of GVA Impacts) as reported in Table 10.15 in Hornsea Four PEIR Volume 3, Chapter 10: Socio-economics

Phase	Stage	UK
Construction	Direct GVA (£ million)	£81.5 - £732.0
	Indirect GVA (£ million)	£53.2 - £602.5
	Total GVA (£ million)	£134.7 - £1,334.5
Operation & Maintenance	Direct GVA (£ million)	£19.5
	Indirect GVA (£ million)	£22.7
	Total GVA (£ million)	£42.3
Decommissioning	<i>The impacts of the decommissioning of Hornsea Four have been scoped out of the assessment on Socioeconomics. Further details are provided in PEIR Volume 4, Annex 5.1: Impacts Register.</i>	

~~16.5.3.2~~16.5.3.3 The assessment for the PEIR determined that Hornsea Four has the potential to generate for the UK study area 296.6 million GVA annually during an estimated build period of 4.5 years and £42.3 million per year over 35 years (excluding any repowering and decommissioning benefits). On any measure this is a substantial contribution to the UK economy.

16.5.4 Supply Chain and Skills Development

16.5.4.1 The UK government is clear that they want to deliver on their net zero by 2050 commitment in a way that maximises the opportunities for UK industry of both the UK's transition and the global shift to clean growth.

16.5.4.2 This is reflected in the UK's Industrial Strategy, UK Offshore Wind Sector Deal (BEIS, 2019)⁹⁵ and the UK governments Ten Point Plan for a Green Industrial Revolution with the sector committing to enhance the UK's supply chain capabilities and increase competitiveness to enable UK suppliers to benefit from both the domestic, as well significant export opportunity that exists.

16.5.4.3 As part of the Offshore Wind Sector Deal, the industry is investing up to £250 million to develop the supply chain, working with Local Enterprise Partnerships (LEPs), councils and development agencies, increasing productivity and fostering innovation. This includes the Offshore Wind Growth Partnership, a new programme of up to £100 million, which will help UK companies seeking to grow their business in the rapidly growing global offshore wind market.

16.5.4.4 Hornsea Four will also support the continued development of the UK's offshore wind clusters, particularly those located near the development, through continued engagement with local business networks in order to increase supply chain participation. For example, Orsted is proud to be part of (and sponsor) the growing Humber Offshore Wind Cluster⁹⁶ and is a leading industry partner in the University of Hull's 'Aura' initiative, a catalyst for

⁹⁵ Department for Business, Energy & Industrial Strategy. Industrial Strategy Offshore Wind Sector Deal. Available [here](#)

⁹⁶ A partnership of industry, academia, and other organisations with the aim of developing and delivering the offshore wind supply chain cluster in the Humber region

innovation in the Humber. This should enable wider benefits to be captured by those regions as the industry grows. In addition to job generation and investment, Hornsea Four will also support the development of skills which the offshore wind industry needs to flourish. Building up to 30GW of offshore wind capacity by 2030 could support 27,000 jobs. This figure will be higher with the new 40GW by 2030 target.

16.5.4.5 Orsted is committed to helping to develop people with the right skills required to the deliver the UK's offshore wind ambitions, specifically within the regions in which it operates. This commitment is reflected in the Application, as the Applicant has developed and will implement an Outline Employment and Skills Plan for Hornsea Four, which must be approved by the relevant planning authority. This is secured through the draft DCO. Skills is also one of the key pillars of Supply Chain Plans, a current pre-requisite for projects of 300MW or more applying for a Contract for Difference (CfD).

16.5.4.6 Orsted's commitment to economic investment and to education in the UK has been demonstrated across its wider portfolio. Orsted adopts a holistic, cross-project approach to developing skills across the UK. The size and location of Hornsea Four make it integral to future initiatives. For example, our current programme includes:

- a) **Apprenticeships:** Partnering with the Grimsby Institute and Furness College to offer a new offshore wind turbine apprenticeship or apprenticeships on the East and West coasts, respectively. The three/four-year apprenticeship comprises of one year of classroom-based learning, followed by two/three years of working on site with Orsted. The apprentices will undertake a Business and Technology Education Council (BTEC) Level 3 in Engineering and Maintenance and Operations Engineering Technician (MOET) qualification, which incorporates a BTEC Level 3 in Engineering and if they successfully complete the programme have become full-time employees at Orsted. Apprentices also have the option to continue their studies and achieve a HNC in Mechanical or Engineering which demonstrates our commitment to advancement and up-skilling of our workforce. The apprenticeship scheme is currently in its fifth year and Orsted have 35 apprentices in the UK advancing through their training and an additional four individuals who have completed their Apprenticeship and are fully qualified wind turbine technicians.
- b) **Skill Events:** Facilitating an increased focused on Science Technology Engineering and Maths (STEM) through participation in regional and national initiatives focused on inspiring the next generation. For example, during the development phase, Hornsea Four supported a number of regional skills events. Orsted also participate in regular skills events based in the Humber including 'Skills Humber' and 'Women into Manufacturing and Engineering, a Humber-wide initiative and have also supported a virtual careers fair organised by the Job Centre and North East Lincolnshire Council to raise awareness of careers in offshore wind for those affected by the pandemic.
- c) **Community Benefits:** Orsted has also supported skills initiatives by assigning funds from Orsted's Community Benefit Funds (CBF). Each year Orsted ring fences approximately £175k across CBFs on the West and East coasts as a skills fund, to fund initiatives that facilitate in the development of skills and employment opportunities. CBFs are voluntary initiatives designed to provide funding to communities located in close

proximity to Orsted wind farms and other infrastructure. For example, Orsted's Walney Extension Community Fund and East Coast Community Fund have ring-fenced £100,000 and £75,000 per annum respectively for exclusive use on skills and training initiatives. The Skills Funds are divided up into different strands, providing hardship loans, financing STEM Engineering Courses and supporting the development and delivery of a STEM training and/or education courses

- d) **Skills and Employment Opportunities:** Active collaboration with relevant Local Enterprise Partnerships, collaborating with the LEPs, local authorities and education providers through Orsted's Outline Employment and Skills Plans to promote opportunities and develop skills in the regions where we operate.
- e) **Innovation:** Partnering with local University Technical Colleges (UTC) and strategic partnerships with UK universities, including supporting PhDs. For example, Orsted has partnered with the Universities of Sheffield, Durham, and Hull, alongside Siemens Gamesa, in a £7.64 million, five-year collaboration programme (the 'Prosperity Partnership') with the Engineering and Physical Sciences Research Council. Orsted is also partnering with Oxford University, signing a 5-year research collaboration agreement with them in 2017, focused on optimising foundation designs. Orsted is also a key partner of the Aura collaboration led by Hull University focusing on R&D, Skills and Business. The Aura Innovation Centre is sited in the East Riding of Yorkshire Local Authority area. As an employer partner of both UTCs in the Humber region Orsted deliver virtual careers talks and student projects to bring their curriculum to life and inspire the next generation.
- f) **Youth Zone:** In 2020 Orsted donated £1m to national Charity OnSide's new Grimsby Youth Zone. The Youth Zone delivers 21st Century Youth Provision and is due to complete in Q4 2023 and will provide upwards of 3,000 young people per year somewhere to go, something to do and someone to talk to. OnSide deliver Youth Zones in deprived areas to support young people to realise their potential and increase their life chances through positive activities in a safe environment.

16.5.5 Employment and Skills Plan

16.5.5.1 At this stage it is not practicable to embed mitigation or enhancements to provide economic benefits due to the early stages of Hornsea Four; however, Hornsea Four has developed an Outline Employment and Skills Plan ([Volume F2, Chapter 18: Outline Employment and Skills Plan](#)) which outlines the plans to enhance the benefits available to the local and national economies. The Applicant will promote the opportunities for local economic benefit associated with Hornsea Four through promoting:

- opportunities for the involvement of local companies in the construction and operation supply chain (this will also be addressed in detail at local, regional and UK level in the Supply Chain Plan (SCP) which is a requirement of the CfD process);
- ability of local residents to access employment opportunities associated with the construction and operation of the wind farm.

16.5.5.2 The Applicant intends to work with the relevant sector and local authority bodies to help secure economic benefits of the offshore wind farm to the local area. The Local Area specifically refers to the functional economic area linked to ports that have the potential to

service the development during the construction and operation phases. Although the port selection has not yet been made, this outline plan has been developed on the assumption that the port selection for both construction and operation phases is within the Humber LEP area as the Environment Impact Assessment (EIA) finds this to be the area most likely to see significant socio-economic impacts.

16.5.5.3 The Outline Employment and Skills Plan will form the basis for a final Employment and Skills Plan, which will be prepared and submitted by the Applicant prior to the commencement of construction activities associated with Hornsea Four.

16.5.5.4 ~~Table 16-4~~~~Table 16-4~~~~Table 16-4~~ below presents examples of commitments to boosting the local economy that could be drawn up as the plan develops.

Table 16-4 Potential Measures for Supply Chain and Skills Activity.

	Supply Chain Development	Skills Activity
<i>Information and Communication</i>	<p>Communication with business groups: maintain open lines of communications with the business groups and fora identified in Table 1 in order to provide updates on the development, support early engagement through supply chain events and provide updates through other communication tools such as newsletters.</p> <p>Encourage engagement: use supply chain events to bring together upper tier suppliers³ from the industry with local companies, including encouraging upper tier suppliers to work with local suppliers in order to highlight forthcoming opportunities. Supply Chain Development events will be used close to project execution when the requirements of Orsted and their upper supply chain tier is more clearly defined.</p> <p>General awareness raising: continue to work with stakeholders to provide updates to local businesses on the progress of the project.</p>	<p>Communicate demands effectively to education and training providers: maintain communication with relevant local education and training providers as construction and operation plans emerge and an understanding of the likely employment opportunities associated with Hornsea Four emerges. This is to maximise the possibility of a timely response to specific training needs from providers.</p> <p>Communicate strategic messages about general skills demands to the LEP: provide market insight and intelligence to the LEP about industry trends, technology developments and associated pressure on skills to inform strategy development</p> <p>Promote job opportunities locally: provide information on the expected employment opportunities to local job seekers in an accessible format. This could include posting on the project’s web portal, advertising in local news publication, and working with local Job Centres.</p> <p>Communicate with businesses to identify skills needs: identify the skills needs associated with the various supply chain opportunities and communicate these to businesses.</p>
<i>Identify Intervention Needs</i>	<p>Identify supply chain development needs: work alongside the stakeholders (including public bodies, industry and business representatives and others), working on insights from local companies, business intermediaries and major component and service suppliers to identify any particular sector development needs locally so that firms will be better placed to access opportunities.</p> <p>Highlight gaps in provision: work with stakeholders to highlight any identified needs which are not being addressed by current business support provision in the local area. This will help to ensure that stakeholders and</p>	<p>Identify skills development needs: Work alongside relevant LEPs, Local Authorities and relevant public sector agencies, as well as businesses in the supply chain, to ensure that relevant stakeholders are well informed about the labour requirements associated with Hornsea Four and any particular gaps in the skills base of the local population that might need to be addressed to help ensure that local people have a good chance of accessing opportunities that arise in the area.</p> <p>Highlight gaps in provision: work with stakeholders to highlight any identified needs which are not being addressed by current skills development programmes in the local area. This will help to ensure that education and skills</p>

	Supply Chain Development	Skills Activity
	business support providers are able to tailor their provision to the requirements of industry.	providers are able to tailor their provision to the requirements of industry.
Other Supportive Activities	Monitor local content: Orsted will act as a regional champion for the Humber in its capacity on steering groups/boards for relevant national supply chain development programmes such as the Offshore Wind Growth Partnership, Fit For Offshore Wind, etc	Promote opportunities widely: ensure that, where possible, opportunities associated with Hornsea Four and the offshore wind sector generally are promoted through the relevant channels, including to young people and groups that are disadvantaged in the labour market.

16.5.6 Public interest

16.5.6.1 While the Applicant is a private entity, the strategy to harness the UK's offshore wind resource to produce renewable electricity can only be delivered through the private sector. The identification and development of offshore sites and the Round 3 Zones (including the former Hornsea Zone) for that purpose is a fundamental national policy pursued within a clear framework, which seeks to protect the environment and human health from the consequences of climate change and promote public safety.

16.5.6.2 Critically, it is a state-led policy. From the earliest rounds of offshore wind, it has been promoted and pursued by the Government, delivered through The Crown Estate. This is true of Round 3 and sites such as Hornsea Four have come forward within Zones identified earlier in the Round 3 process by the Government and TCE. Site appraisal was initiated by the Government through Strategic Environmental Appraisals (SEA), with subsequent site appraisal and delivery refined by TCE through SEA and Zone Appraisal and Planning studies.

16.5.6.3 Therefore, the policy drivers for offshore wind clearly lie in and serve the public interest. However, delivery of that public interest must be through private companies such as Orsted A/S. Orsted A/S has around 30 years' experience and a strong track record developing, building, and operating offshore wind farms; globally, Orsted has installed 7.6 GW of offshore wind capacity, with a further 2.3 GW under construction and a pipeline of projects in development.

16.5.6.4 MN 2000 acknowledges that it is the nature of the interest, not the party promoting that interest, that must be public:

"As regards the "other imperative reasons of overriding public interest" of social or economic nature, it is clear from the wording that only public interests, irrespective of whether they are promoted either by public or private bodies, can be balanced against the conservation aims of the Directive."⁹⁷

⁹⁷ MN 2000 Guidance at page 58

16.5.6.5 It is beyond doubt that projects developed by private bodies can be considered where such public interests are served, as in this case.

16.5.7 A long-term interest

16.5.7.1 For IROPI to arise, the public interest would usually be long-term. Each public interest identified above is a long-term UK interest – decarbonisation, security of supply, provision of low-cost energy, protecting the human species and the environment, providing employment opportunities, contribution to the UK economy, provision of skills training and community benefit.

16.5.7.2 Hornsea Four will be capable of providing clean energy generation for around 35 years (possibly longer) and it can be deployed within a relatively short time frame (within the 2020s). It will contribute to the UK's future low carbon energy mix needed to meet UK's net zero commitment but also beyond 2050.

16.5.7.3 As demonstrated in the Statement of Need ([Volume F1, Chapter 6: Statement of Need](#)) and [Part 2](#) of this report (see [Section 10](#)) delivery of offshore wind resource is urgently required to bridge the gap between the move away from carbon generation technologies to the large-scale deployment of other technologies such as nuclear, wave and tidal.

16.5.7.4 All scenarios forecast to achieve net zero involve the large-scale deployment of renewable generation, with the CCC stating that at least 75_GW of offshore wind is required⁹⁸. Electricity demand is predicted to rise and there is a long-term interest in ensuring that the lights remain on, whilst also meeting decarbonisation targets and combatting climate change.

16.5.7.5 Large energy infrastructure projects have a long lead time due to the planning and consenting framework. The potential contribution of Hornsea Four is significant to decarbonisation and security of supply, but also strategically important, to ensuring continuity in the offshore wind sector. Through the Offshore Wind Sector Deal, industry has committed to strengthening the competitiveness of the UK supply chain, consistent with the

⁹⁸ CCS Net Zero report at page 191.

UK's Clean Growth Strategy. This is a long-term endeavour which seeks to maximise the advantages for UK industry from the global shift to clean growth.

16.5.7.6 Economic benefits will derive not only from the direct construction, operation, and maintenance of Hornsea Four but from the important confidence it will bring to the UK supply chain.

16.5.8 Overriding Interest

16.5.8.1 Consideration of IROPI necessarily involves a balancing exercise and an exercise of planning judgement by the decision maker, which in the case of the Application is the SoS.

16.5.8.2 In case C-239/0436, Advocate General Kokott said⁹⁹:

"The necessity of striking a balance results in particular from the concept of 'override', but also from the word 'imperative'. Reasons of public interest can imperatively override the protection of a site only when greater importance attaches to them. This too has its equivalent in the test of proportionality, since under that principle the disadvantages caused must not be disproportionate to the aims pursued."

16.5.8.3 Or, as put by the EC in C-239/04 82:

"...the choice requires a balance to be struck between the adverse effect on the integrity of the SPA and the relevant reasons of overriding public interest."¹⁰⁰

16.5.8.4 It will be for the SoS therefore to make a judgement on whether the substantial, long-term public interest that Hornsea Four delivers, outweighs any potential harm to the individual European site which is the subject of this submission.

16.6 Relevant UK Examples involving Renewable Energy

16.6.1 Hornsea Project Three

16.6.1.1 Orsted is developing Hornsea Three which is a proposed offshore windfarm (OWF) of up to 231 wind turbines with an electrical capacity in the region of 2.4GW. Subsequent to the Examination of the Hornsea Three DCO, the SoS could not rule out an AEol on the kittiwake feature of the FFC SPA in-combination with other plans or projects. Having satisfied himself that there were no alternative solutions to Hornsea Three, the SoS therefore considered whether Hornsea Three was required for IROPI and was satisfied that there were IROPI for Hornsea Three to proceed. In arriving at this conclusion, the SoS noted¹⁰¹:

- *"the principal and essential benefit of the Development as a significant contribution to limiting the extent of climate change in accordance with the objectives of the Climate Change Act 2008. The consequences of not achieving those objectives would be severely deleterious to societies across the globe, including the UK, to human health, to social and economic interests and to the environment (paragraph 7.37)"*

⁹⁹ Opinion of AG, C-441/03, Commission v Netherlands, paragraph 16.

¹⁰⁰ Opinion of AG, C-239/04, Commission v Portugal at paragraph 44.

¹⁰¹ Department for Business, Energy and Industrial Strategy Hornsea Project Three Habitats Regulation Assessment and Marine Conservation Zone Assessment. December 2020. Available [here](#)

- *"The need to address climate change is the principal tenet behind the Climate Change Act 2008 and the framework subsequently publishing for delivering the UK's international commitments on climate change which include NPSs for energy (EN-1)¹⁰², renewable energy infrastructure (EN-3)¹⁰³ and electricity networks (EN-5)¹⁰⁴ (paragraph 7.38)"*
- *"the evolving understanding of the urgency of actions to combat climate change, including the legally binding commitment to reduce greenhouse gas emissions to net zero by 2050, made in July 2019 (paragraph 7.39)*
- *that "the Government has also set up schemes to facilitate its strategy for decarbonisation through deployment of such projects and to provide the public with value for money, such as via the Contracts for Difference scheme (paragraph 7.40)"*
- *That "Offshore wind generation schemes can only be developed through the mechanism put in place by The Crown Estate for leasing areas of the seabed in a structured and timely way. Projects, like the Development, which make a significant contribution to meeting the target capacity in the timeframe required are therefore both necessary and urgent (paragraph 7.42)"*

16.6.1.2 Consent for Hornsea Project Three was granted on 31 December 2020.

16.6.2 Able Marine Energy Park

16.6.2.1 The SoS has considered IROPI before in the context of the deployment of renewable energy, in the Able Marine Energy Park (AMEP) DCO. In the decision letter for the AMEP DCO the SoS found the following grounds constituted IROPI and outweighed the loss of 45 hectares of a European site¹⁰⁵:

16.6.2.2 Decarbonising the means of energy production;

- Securing energy supplies from indigenous sources.
- Manufacturing large scale offshore generators;
- Increasing the UK's manufacturing base; and
- Regenerating the Humber sub-region.

16.6.2.3 Overall, the SoS was satisfied that the AMEP development would make a significant contribution to these imperative needs in the long term, providing support to the offshore renewable energy industry while making a major contribution to employment and the economy.

16.6.2.4 Consistent with the AMEP DCO, previously a Planning Inspector appointed to hold an Inquiry into the Little Cheyne Court Wind Farm section 36 consent application had to consider the question of IROPI for renewable energy deployment.

16.6.2.5 Ultimately, the SoS found that there would be no AEoI from the development¹⁰⁶. However, following an Inquiry, the Inspector found that (should IROPI have to be considered) the urgent need for renewable energy would outweigh the risk of harm. (In this case English Nature¹⁰⁷ and RSPB did not assert that any ecological harm would occur, they argued that

¹⁰² Department of Energy & Climate Change. Overarching National Policy Statement for Energy (EN-1). TSO, 2011.

¹⁰³ Department of Energy & Climate Change. National Policy Statement for Renewable Energy Infrastructure (EN-3). TSO, 2011

¹⁰⁴ Department of Energy & Climate Change. National Policy Statement for Electricity Networks Infrastructure (EN-5). TSO, 2011.

¹⁰⁵ SoS's Decision Letter dated 18 December 2013, Annex I at paragraph 17

¹⁰⁶ Little Cheyne Court SoS Decision Letter dated 18 October 2005 at paragraph 6.6.

¹⁰⁷ Natural England as then was

it could not be shown that harm will not occur.) The Inspector found this to be particularly the case where there is a lack of other proposals to meet the Government's country-wide and regional targets¹⁰⁸. From these it is evident that the public interests that Hornsea Four will similarly serve (and on a much greater scale) are plainly capable of constituting IROPI.

16.7 A Balancing Exercise

16.7.1.1 Hornsea Four's Overriding Interest set against the Envisaged Harm. It is for the SoS to carry out a balancing exercise against any risk of harm (and the degree of such harm). To inform the SoS's exercise of judgement as to the planning balance the following sections consider the predicted impacts on the FFC SPA against the clear public interest in Hornsea Four.

16.7.2 The Flamborough and Filey Coast SPA

16.7.2.1 The Flamborough Head and Bempton Cliffs SPA was classified in August 1998. In August 2018, the site was extended and re-named the Flamborough and Filey Coast SPA. The site qualified under Article 4(2) of the Habitats Directive (92/43/EC) by supporting over 1% of the biogeographical populations of four regularly occurring migratory species and a breeding seabird assemblage of European importance (see [Table 16-5](#)~~Table 16-5~~~~Table 16-5~~).

Table 16-5 Qualifying features of the FFC SPA

Species	Count (period)	% of subspecies or population (pairs)
Black-legged kittiwake <i>Rissa tridactyla</i>	44,520 pairs (latest count ¹⁰⁹ cites 51,535) 89,040 breeding adults (2008-2011)	2% North Atlantic
Northern gannet <i>Morus bassanus</i>	8,469 pairs 16,938 breeding adults (2008-2012)	2.6% North Atlantic
Common guillemot <i>Uria aalge</i>	41,607 pairs 83,214 breeding adults (2008-2011)	15.6% (<i>Uria aalge albionis</i>)
Razorbill <i>Alca torda</i>	10,570 pairs 21,140 breeding adults (2008-2011)	2.3% (<i>Alca torda islandica</i>)
	Count period	Average number of individuals
Seabird assemblage	2008-2012	216.730

[16.7.2.2](#) The Applicant's predicted impacts on these seabird species and relevant features of the FFC SPA from Hornsea Four are set out in

¹⁰⁸ Little Cheyne Court Inspector's Report submitted on 13 May 2005 at paragraph 461.

¹⁰⁹ Latest colony census (2017) identified a population of 51,535 breeding pairs

Table 16-6

~~16.7.2.2~~[16.7.2.3](#) ~~Table 16-6~~**Table 16-6.**

Table 16-6: Summary of Hornsea Four predicted impacts on the relevant features of the FFC SPA

Impact	Quantification of Effect
Project Collision Risk on kittiwake (B2.2 Report to Inform Appropriate Assessment)	Project alone: 21.22 individuals
Project Collision Risk and Displacement Effect on Gannet ((B2.2 Report to Inform Appropriate Assessment))	Project alone: 11.77 - 12.85 individuals
Project Displacement Effect on guillemot (B2.2 Report to Inform Appropriate Assessment)	Project alone: 35.05 individuals (based on 50% displacement and 1% mortality)
Project Displacement Effect on razorbill (B2.2 Report to Inform Appropriate Assessment)	Project alone: 1.5 individuals (based on 50% displacement and 1% mortality)

~~16.7.2.3~~ 16.7.2.4 In these predictions, the Applicant has applied the precautionary principle to ensure full consideration of impacts to the site that are both potentially significant and yet uncertain. Many parameters represent a highly precautionary reflection of the maximum scale and impact of the project. Notwithstanding, it is the Applicant's position that the impacts predicted with regards to gannet, guillemot and razorbill, either individually or collectively, will not result in an AEOI and the overall population rate of these SPA all species assessed would continue to grow. However, as explained in paragraph 1.2.1.51.2.1.51.2.1.751.2.1.5, an AEOI cannot be ruled out in relation to the kittiwake feature.

16.7.3 The Hornsea Four Project

16.7.3.1 However, if the SoS concludes AEoI then the SoS must determine where the balance lies between the public interest of conserving biodiversity and the public interest(s) provided by the project. In the case of Hornsea Four, the project will, despite the measure of harm predicted, serve the interest of conserving biodiversity. As global warming accelerates, warmer winter sea temperatures have caused shifts in the abundance and quality of seabird prey species such as sandeels, with knock-on effects for seabirds. In addition, an increase in the frequency of extreme weather events could affect breeding habitat and create unfavourable foraging conditions, which may lead to increased mortality of adults and chicks. Hornsea Four will provide a significant contribution to alleviating one of the key anthropogenic pressures on the seabirds at the FFC SPA: climate change driven reductions in prey availability.

16.7.3.2 The Habitats Regulations require that compensatory measures are provided to counter a project's predicted adverse impacts and ensure that the integrity of the impacted site, and therefore the National Site Network, is maintained. The Applicant will meet the cost of the compensatory measures required for potential damage caused to the SPA in order to protect the overall coherence of the National Site Network. The Applicant's consultation

summary ([Volume B12, Chapter 91: ~~Consultation Summary~~ Record of Consultation](#)) is submitted alongside the without prejudice derogation case.

16.7.3.3 Hornsea Four is a project of national strategic importance for the future protection of local communities, property, and infrastructure and to ensure a reliable supply of electricity for the UK in the long-term. Concurrently, the transition to renewable energy is more beneficial ecologically than a continuous reliance on fossil fuels. If the SoS concludes AEol, it is considered the finding would be marginal and based upon highly precautionary assumptions. The requirements of the HRA Derogation Provisions can readily and clearly be met, in the marginal circumstances of Hornsea Four.

~~16.7.3.4~~ The long-term public interest that Hornsea Four delivers, must outweigh the potential harm to the individual European site which is the subject of this submission. -There are no alternatives to Hornsea Four. -As the project is a fundamental component of the country's need and obligations to address climate change, the potential harm is clearly outweighed by the clear public interest. -Ultimately the decision over a long-term renewable energy strategy versus predicted adverse impacts (which the Applicant considers to be [highly](#) [overly](#) precautionary) on a European site rests with the SoS.

17 Hornsea Four IROPI Conclusion

- 17.1.1.1 This submission demonstrates a compelling case that Hornsea Four is indispensable and must be carried out for IROPI.
- 17.1.1.2 Hornsea Four can substantially contribute to the UK's legally binding climate change targets by helping to decarbonise the UK's energy supply, whilst also contributing to the essential tasks of ensuring security of supply and providing low-cost energy for consumers in line with the UK government's national policies.
- 17.1.1.3 Hornsea Four will contribute to tackling the climate change risks identified in the UK CCC's "UK Third Climate Change Risk Assessment (CCRA3)", all of which impact the core IROPI of human health, public safety, and the primary importance of the environment.
- 17.1.1.4 Hornsea Four will also contribute materially to the economic and social landscape in the UK as it can provide substantial employment opportunities and skills development, particularly in coastal communities, whilst also playing a major role in supporting the UK's supply chain.
- 17.1.1.5 If the SoS finds AEol in respect of the FFC SPA then there is a demonstrable overriding public interest in Hornsea Four and the policy objectives it will serve, which outweighs the risk of any adverse impact on the FFC SPA.