From:	Dominika Phillips
To:	Hornsea Project Three; KJ Johansson; Kay Sully
Cc:	Andrew Guyton; Stuart Livesey
Subject:	Hornsea Project Three (UK) Ltd response to Deadline 4 (Part 14)
Date:	15 January 2019 23:22:12
Attachments:	image001.png D4_HOW03_Appendix 65_Dogger Bank_HRA.pdf D4_HOW03_Appendix 66_Hornsea Two.pdf D4_HOW03_Appendix 67_Hornsea Two_HRA.pdf D4_HOW03_Appendix 68_East Anglia Three_HRA.pdf

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Dear Kay, K-J

Please find attached the 14th instalment of documents.

Best regards,
Dr Dominika Chalder PIEMA
Environment and Consent Manager

[redacted]

Environmental Management UK | Wind Power
5 Howick Place | London | SW1P 1WG

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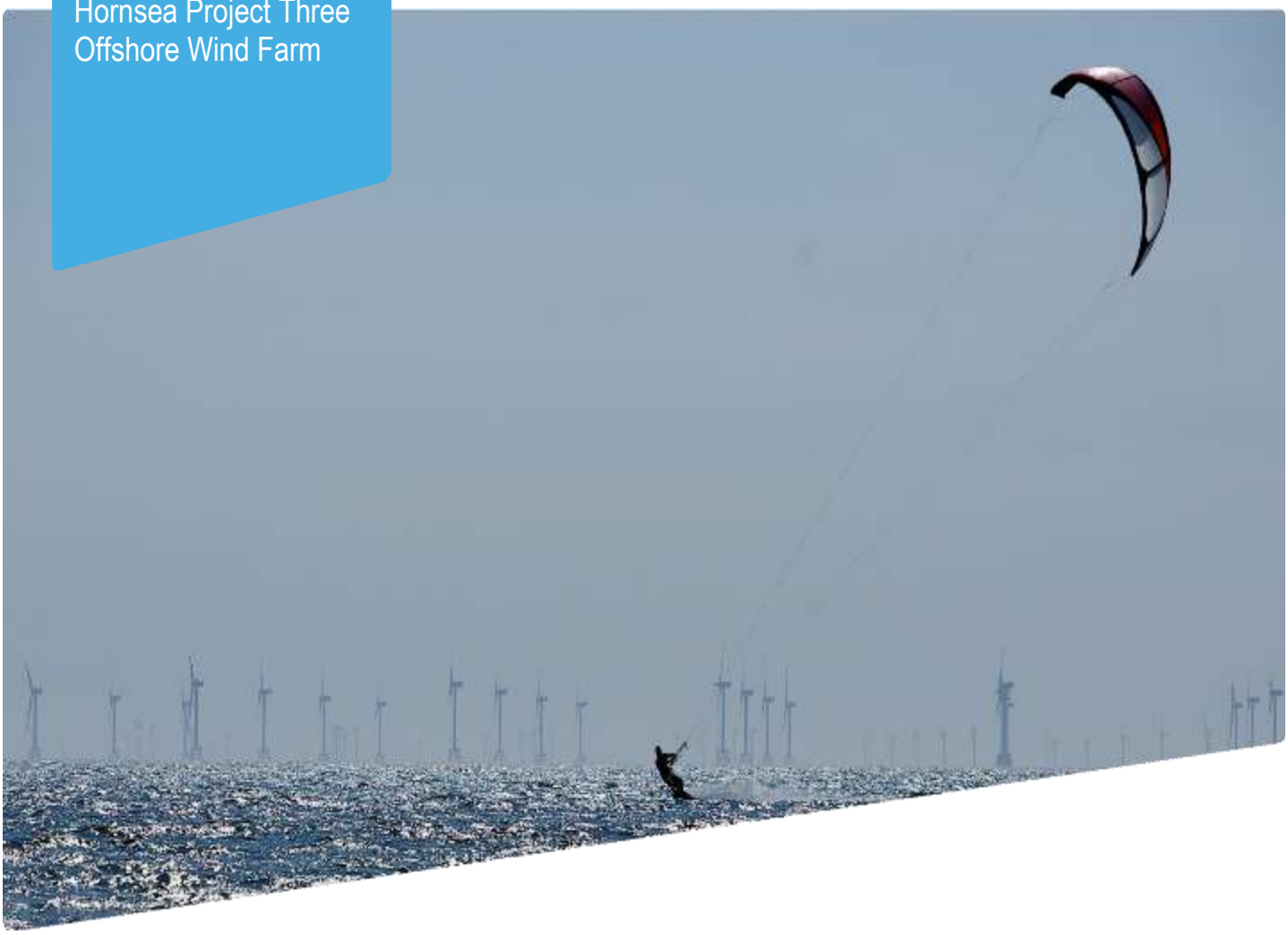
Hornsea Project Three
Offshore Wind Farm



Hornsea Project Three

Offshore Wind Farm

Appendix 67 to Deadline 4 Submission – Hornsea Project Two HRA Report

Date: 15th January 2019

Hornsea 3
Offshore Wind Farm

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Document Control			
Document Properties			
Organisation	Ørsted Hornsea Project Three		
Author	HOW02		
Checked by	n/a		
Approved by	n/a		
Title	Appendix 67 to Deadline 4 Submission – Hornsea Project Two HRA Report		
PINS Document Number	n/a		
Version History			
Date	Version	Status	Description / Changes
15/01/2019	A	Final	Submitted at Deadline 4 (15/01/2019)

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Front cover picture: Kite surfer near a UK offshore wind farm © Ørsted Hornsea Project Three (UK) Ltd., 2019.

RECORD OF THE HABITATS REGULATIONS ASSESSMENT UNDERTAKEN UNDER REGULATION 61 OF THE CONSERVATION OF HABITATS AND SPECIES REGULATIONS 2010 AND REGULATION 25 OF THE OFFSHORE MARINE CONSERVATION (NATURAL HABITATS &c.) REGULATIONS 2007 FOR AN APPLICATION UNDER THE PLANNING ACT 2008

This report includes a transboundary assessment of impacts

***Project Title*: Hornsea Project Two**

Date: 15th, August, 2016

CONTENTS

Introduction

Background

1.0 This is a record of the Habitats Regulations Assessment ("HRA") that the Secretary of State for Business, Energy and Industrial Strategy has undertaken under the Conservation of Habitats and Species Regulations 2010 ("the Habitats Regulations") and the Offshore Marine Conservation (Natural Habitats & c.) Regulations 2007 ("the Offshore Habitats Regulations") in respect of the Development Consent Order ("DCO") and Deemed Marine Licence ("DML") for Hornsea Project Two and its associated infrastructure (the "Project"). For the purposes of these Regulations the Secretary of State is the competent authority.

1.1 The report also contains analysis and assessment of the potential impacts of the Project upon designated sites in other European Economic Area States ("transboundary sites"). This is included under the transboundary assessment section of the report (Section 18).

1.2 The development proposed comprises up to two offshore wind generating stations in the North Sea, and all offshore and onshore infrastructure necessary to connect to the national grid. The installed generating capacity has a combined output of up to 1,800MW. The western boundary of the wind turbine zone is 89 km off the coast of the East Riding of Yorkshire; the zone covers an area of approximately 462 km². The transmission cables will come ashore at Horseshoe Point in Lincolnshire, and then run for about 40km underground to the North Killingholme National Grid substation. The Project application is described in more detail in Section 2.

1.3 The Project constitutes a nationally significant infrastructure project (NSIP) as defined by s.14(1)(a) of the Planning Act 2008 as it is for a generating station of over 100MW, having a generation capacity of up to 1,800MW.

1.4 The Project was accepted by the Planning Inspectorate ("PINS") on 19 February 2015 and a four-member Panel of Inspectors ("the Panel") was appointed as the Examining Authority ("ExA") for the application. The examination of the Project application began on 16 June 2015 and completed on 16 December 2015. The Panel submitted its report of the examination, including its recommendation ("the ExA's Report"), to the Secretary of State on 16 March 2016.

1.5 The Secretary of State's conclusions on habitats and wild birds issues contained in this HRA report have been informed by the ExA's Report, and further information and analysis, including the ExA's Report on the Implications for European Sites ("RIES") and written responses to it.

Habitats Regulations Assessment (HRA)

1.6 Council Directive 92/43/EC on the conservation of natural habitats and of wild fauna and flora ("the Habitats Directive") and Council Directive 2009/147/EC on the conservation of wild birds ("the Birds Directive") aim to ensure the long-term survival of certain species and habitats by protecting them from adverse effects of plans and projects.

1.7 The Habitats Directive provides for the designation of sites for the protection of habitats and species of European importance. These sites are called Special Areas of Conservation ("SACs"). The Birds Directive provides for the classification of sites for the protection of rare and vulnerable birds and for regularly occurring migratory species. These sites are called Special Protection Areas ("SPAs"). SACs and SPAs are collectively termed European sites and form part of a network of protected sites across Europe. This network is called Natura 2000.

1.8 The Convention on Wetlands of International Importance 1972 ("the Ramsar Convention") provides for the listing of wetlands of international importance. These sites are called Ramsar sites. UK Government policy is to afford Ramsar sites in the United Kingdom the same protection as European sites.

1.9 In the UK, the Habitats Regulations transpose the Habitats and Birds Directives into national law as far as the 12 nm limit of territorial waters. Beyond territorial waters, the Offshore Habitats Regulations serve the same function for the UK's offshore marine area. The Project covers areas within and outside the 12 nm limit and on shore so both sets of Regulations apply.

1.10 Regulation 61 of the Habitats Regulations provides that:

> *….before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which (a) is likely to have a significant effect on a European site or a European offshore marine site (either alone or in-combination with other plans or projects), and (b) is not directly connected with or necessary to the management of that site,* [the competent authority] *must make an appropriate assessment of the implications for that site in view of that site's conservation objectives.*

1.11 Regulation 25 of the Offshore Habitats Regulations contains similar provisions:

> *Before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which (a) is to be carried out on any part of the waters or on or in any part of the seabed or subsoil comprising an offshore marine area or on or in relation to an offshore marine installation (b) is likely to have a significant effect on a European marine site (either alone or in-combination with other plans or projects) and (c) is not directly connected with or necessary to the management of that site, a competent authority must make an appropriate assessment of the implications for that site in view of that site's conservation objectives..*

1.12 This Project is not directly connected with, or necessary to, the management of a European site or a European marine site. The Habitats Regulations and the Offshore Habitats Regulations require that, where the project is likely to have a significant effect ("LSE") on any such site, where not connected with, or necessary to, the management of that European site, an appropriate assessment ("AA") is carried out to determine whether or not the project will have an adverse effect on the integrity of the site in view of that site's Conservation Objectives. In

this document, the assessments as to whether there are LSEs, and, where required, the AAs, are collectively referred to as the Habitats Regulations Assessment ("HRA").

1.13 The HRA takes account of mitigation measures which are secured by requirements and conditions.

1.14 This report should be read in conjunction with the following documents that provide extensive background information, a fuller list of documents is provided in the References section of this report:

- The ExA's Report
- The RIES
- The Applicant's ES
- The Applicant's HRA (and associated documents)
- Plus other documents submitted during the Examination and during the course of the Secretary of State's consideration of the Application, available at: https://infrastructure.planninginspectorate.gov.uk/projects/yorkshire-and-the-humber/hornsea-offshore-wind-farm-zone-4-project-two/

1.15 The key information in these documents and written representations is summarised and referenced in this report.

The RIES and Statutory Consultation

1.16 Under the Habitats Regulations and the Offshore Habitats Regulations the competent authority must, for the purposes of an AA, consult the appropriate nature conservation body and have regard to any representation made by that body within such reasonable time as the authority specifies.

1.17 Natural England ("NE") is the Statutory Nature Conservation Body ("SNCB") for England and for English waters within the 12 nm limit. The Joint Nature Conservation Committee ("JNCC") is the SNCB beyond 12 nm, but this duty has been discharged by NE following the 2013 Triennial Review of both organisations (Defra, 2013). However, JNCC retains responsibility as the statutory advisor for European Protected sites that are located outside the territorial sea and UK internal waters (i.e. more than 12 nautical miles offshore) and as such continues to provide advice to NE on the significance of any potential impacts on interest features of such sites.

1.18 The ExA prepared a RIES, with support from the Planning Inspectorate Environmental Services Team. The RIES was based on matrices provided by the Applicant and relevant information provided by Interested Parties. The RIES documented the information received during the examination (up until 12 November 2015) and presented the ExA's understanding of the main facts regarding the HRA to be carried out by the Secretary of State. The RIES was issued to ensure that Interested Parties, including the SNCBs, were consulted formally on habitat regulations matters, as required under regulation 61(3) of the Habitats Regulations and regulation 25(3) of the Offshore Habitats Regulations.

1.19 The RIES was published on PINS planning portal website[1] and the ExA notified Interested Parties that it had been published; responses were required by 26 November 2015. Comments were provided by the Applicant, NE and the Royal Society for the Protection of Birds (RSPB).

1.20 The Secretary of State is content to accept the ExA's recommendation that the RIES, and consultation on it, represents an appropriate body of information to enable the Secretary of State to fulfil his duties in respect of European sites. However in the case of two proposed European sites: Southern North Sea proposed Special Area of Conservation (pSAC), and the Flamborough and Filey Coast pSPA; one proposed extension to an existing European site: Hamford Water pSPA, and two existing SPAs, the Forth Islands SPA, and Foulsheugh SPA, the Secretary of State requested additional information from interested parties (details of this are set out in each of the relevant site's sections).

1.21 This HRA has been based on the RIES, responses to the RIES and responses to the Secretary of State's consultations of 29 March 2016[2], 7 April 2016[3], 28 April 2016[4], 26 May 2016[5], and 12 July 2016[6].

[1] http://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/2.%20Post-Submission/EIA/Habitat%20Regulations/Report%20on%20the%20Implications%20for%20European%20sites.pdf
[2] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-000749-Department%20for%20Energy%20and%20Climate%20Change%20Request%20Letter%20to%20Joint%20Nature%20Conservation%20Committee%20and%20Natural%20England%20.pdf
[3] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-000913-Department%20for%20Energy%20and%20Climate%20Change%20consultation%20letter%20dated%207%20April%202016.pdf
[4] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-000928-Department%20of%20Energy%20and%20Climate%20Change%20Consultation%20Letter%20Dated%2028%20April%202016.pdf
[5] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-001315-DECC%20consultation%20letter%20Hornsea%20Offshore%20Windfarm%20(Zone%204)%20-Project.pdf
[6] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002054-12%20July%20%20DECC%20consultation%20letter%20HORNSEA%20Project%202.pdf

Development Description

2.0 The Hornsea Zone is located in the southern North Sea. The East Riding of Yorkshire coast lies 31km to the west; the zone's eastern boundary is 1km from the median line between the United Kingdom and Dutch waters. The Project is the second wind farm project proposed within the Hornsea Zone. The first wind farm project within the Hornsea Zone, Hornsea Project One, has a capacity of 1,200MW and was granted development consent by the Secretary of State on 10 December 2014 (SI: 2014/331 and correction order SI: 2015/1280).

2.1 The area within the Hornsea Zone in which the Project's turbines and inter-array cabling, as well as associated infrastructure, will be placed, has been labelled 'Subzone 2'. Subzone 2 is located in the centre of the Hornsea Zone, 89 km from the coast of the East Riding of Yorkshire and 50 km from the median line between United Kingdom and Dutch waters. Subzone 2 has an area of approximately 462 km² and lies within the UK Renewable Energy Zone.

Development Components

2.2 The Project comprises up to two offshore wind farms (Projects A and B), consisting in total of up to 300 wind turbine generators, with an installed capacity of up to 1,800MW, and all offshore and onshore infrastructure necessary to connect to the national grid. The application is for development consent to construct, operate and maintain the Project.

2.3 The key components of the Project are as follows:

Works 1A and 1B

- Up to 300 wind turbine generators fixed to the seabed
- A network of subsea inter-array electrical circuits
- Up to two offshore accommodation platforms

2.4 The DCO includes the following works as associated development:

Works 2A and 2B

- Up to six offshore HVAC collector substations or up to two offshore HVDC converter substations

Works 3A and 3B

- In the event that the mode of transmission is HVAC - up to two offshore HVAC reactive compensation substations.

Works 4A and 4B

- Up to eight subsea electrical circuits proceeding from the offshore HVAC collector substations (Works 2A and 2B), or up to two electrical circuits proceeding from the offshore HVDC converter substations (Works 2A and 2B).

Works 5-10

- Onshore connection to the National Grid substation; including onshore HVDC converter substation and/or onshore HVAC substation.

2.5 Further associated development required to support this project includes scour protection, dredging, cable protection measures, the disposal of material, works to alter the position of apparatus, works to alter the course of non-navigable rivers, streams or watercourses, landscaping works, works for the benefit of land, working sites during construction, works to secure means of access, surface water drainage systems, private roads and hardstanding, link and/or earthing boxes, jointing pits, temporary haul roads, temporary access tracks and works to enable utility services to be run through specified land.

2.6 The DCO includes the following as ancillary works:

- temporary anchorage of vessels; and
- buoys, beacons, fenders and other navigational warning or ship impact protection works.

2.7 The offshore cable route corridor for the Project would extend from the proposed landfall at Horseshoe Point, near North Coates village, in Lincolnshire, offshore in a north-easterly direction to the southern boundary of Subzone 2. The route is approximately 150km in length.

2.8 From the proposed landfall point at Horseshoe Point, onshore cables will connect the offshore wind farm to the existing NG substation at North Killingholme (400 kilovolt (kV)) in North Lincolnshire. The onshore cable route is approximately 40km long. The Applicant states that it is proposing to transmit the electricity generated either via high voltage cables using direct current (HVDC) or alternating current (HVAC) or a combination of the two [APP-027].

2.9 Full details of the infrastructure to be used in the Development are detailed in Schedule 1, Part 1 of the DCO.

Rochdale Envelope

2.10 The Applicant has adopted a 'Rochdale Envelope' approach within their ES. The Rochdale Envelope is a term used in planning to reflect that often a developer will not know all of the details associated with the proposal at the time of application. The Rochdale Envelope allows the Applicant to set out the broad range of options under consideration and then carry out an ES based on the realistic worst case scenario for each of those options. These options are used within the ES to assess the significance of the Project's environmental effects. This allows the Applicant to apply for a DCO that allows some flexibility in the final design of the Project whilst providing certainty that no greater environmental effects than those described in the ES can occur, providing the final project design lies within the options assessed

2.11 Within the context of the Rochdale Envelope, the application provides for up to two wind farms, Project A and Project B, each with its own generation and transmission infrastructure. The

application also provides for different types of offshore and onshore substations, and for different high voltage current technologies.

2.12 The Applicant requested various changes to the Project (outlined in the ExA Report Section 2.2). These reduced the Project's design envelope, including the removal of the 5MW wind turbine generator (WTG) option leaving a design envelope comprising a WTG range from 6MW - 15MW. The consequence of this is an approximate 17% reduction in the overall maximum number of turbines within the Project's envelope from 360 to 300. This would not restrict the Project from maintaining the maximum generation capacity of 1,800MW. The ExA concluded that all changes were within the upper limits of the Rochdale Envelope and had impacts equal to or less than the worst case scenarios set out in the ES, and all the changes were accepted by the ExA (ExA's Report: Section 2.2.8).

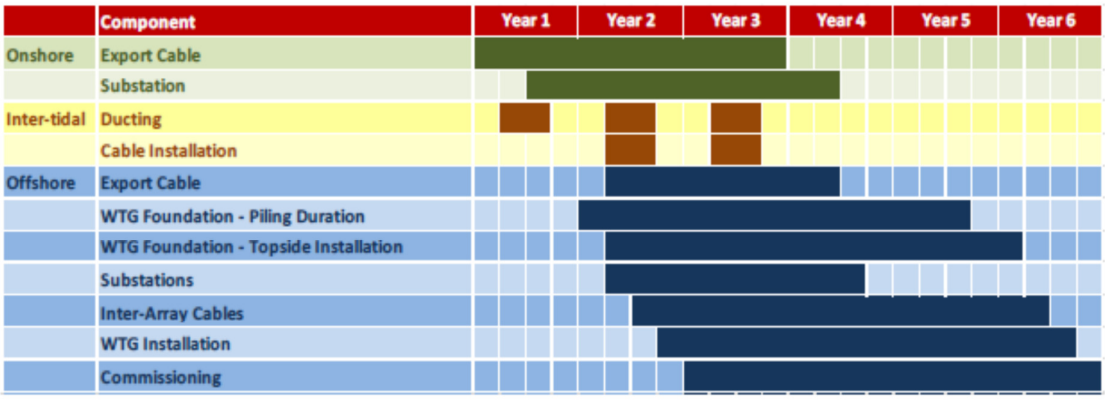
2.13 The ES is based on the assessment of the realistic worst case scenario in environmental terms. The Project is however, bound by the DCO application boundary, which sets out areas within which the infrastructure can be located, together with various technical restrictions.

Development stages

Construction

2.14 Construction work is proposed to commence in 2017. A summary of an indicative construction programme, showing the scenario of a single phase of construction, is presented in Figure 1. The durations identified are realistic worst case estimates for a single phase construction for the build of the maximum project capacity and number of components. Actual durations will be dependent on a number of factors including, component and vessel availability, weather and final construction strategy.

Figure 1: **Indicative single phased construction Programme (Smart Wind ES: 7.1.3 Project Description)**



2.15 Whilst Figure 1 shows a single phased construction programme, the Project could be built in up to four phases. In a multiphase construction scenario, the programme would differ from that shown in Figure 1 in a number of ways. Particularly, 'gaps' could open within bars that represent

the construction activities. Following the completion of certain tasks (WTG foundation installation, for example) for a given phase some amount of time could pass prior to those tasks being resumed for subsequent phases.

2.16 The construction of offshore WTGs and transmission infrastructure is currently scheduled to take place 24 hours per day throughout the year, subject to weather conditions, until construction is complete. The offshore construction, including all phases and gaps between phases, will be completed within six years from the start of offshore construction.

2.17 The final construction programme will be submitted to the MMO under the requirements of the DML (Condition 8(2)). The Code of Construction Practice (Volume 4- Annex 7.4.3.5 of the ES) which will detail the onshore programme of construction will be required under the DCO to be submitted to the Local Planning Authorities for their approval (Requirement 7).

Operation and Maintenance

2.18 The overall operation and maintenance strategy has not been finalised for the Project. It is anticipated that this will be finalised once the operation and maintenance onshore base location and technical specification of the Project are known, including WTG type, electrical export option, and final project layout. As a result, an operation and maintenance base is not included in the DCO application.

2.19 The operation and maintenance strategy could include either an onshore base or an offshore base (accommodation platforms), or both. However, an initial worst case scenario strategy has been developed by the Applicant in order to define key parameters against which the environmental effects of the operations and maintenance strategy can be assessed.

Offshore Decommissioning

2.20 Decommissioning for the offshore elements of the project is regulated under the Energy Act 2004. Broadly speaking, under that Act, the Secretary of State has powers to require a person who is responsible for an offshore renewable energy installation to prepare a costed decommissioning programme setting out how the project will be removed and ensure that the programme is carried out. The Secretary of State can approve, modify or reject a decommissioning programme at any point.

2.21 It is not possible at this stage to predict with any certainty what the European and Ramsar site context of the Project will be in the future as sites may change over that time. Decommissioning activities will need to comply with all relevant UK legislation at the time. Separate authorisations will also be required as part of decommissioning, after the preparation of an ES and HRA by the authorising body (including appropriate consultation with the relevant SNCBs). The decommissioning programme is included as Requirement 16 within the DCO for the Project. The DCO also allows the Secretary of State to require the restoration of the offshore works in the case of abandonment or decay. The decommissioning plan will be updated during the project's lifespan to take account of changing best practice and new technologies.

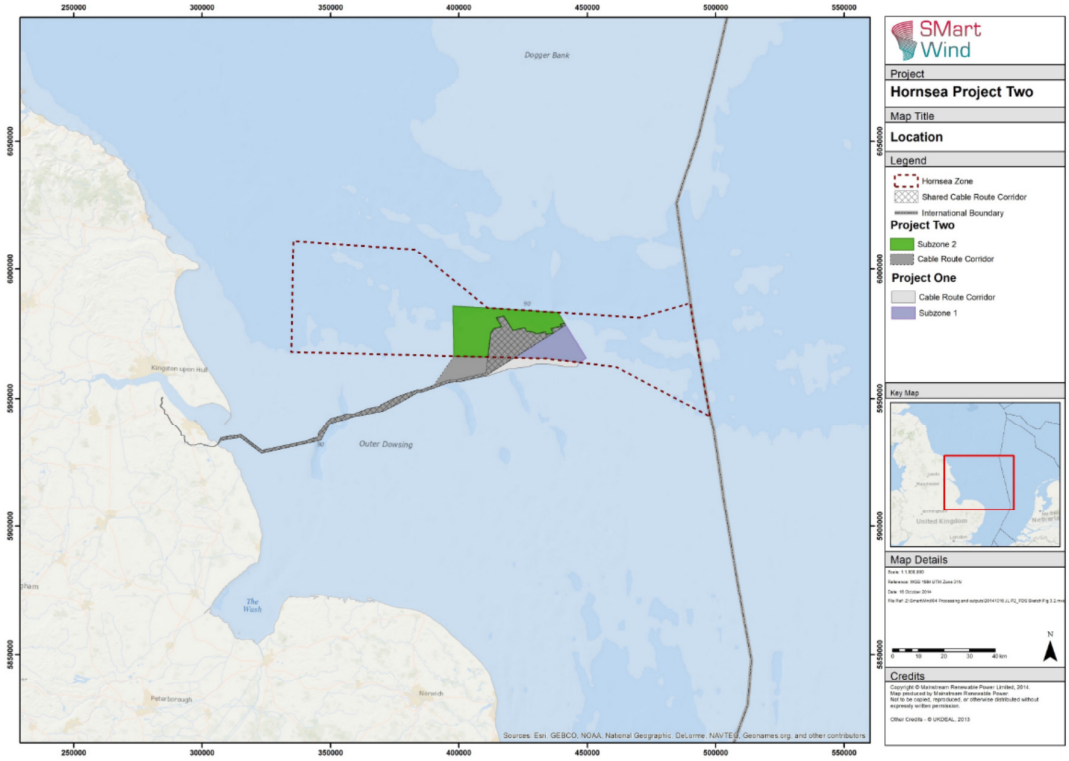
2.22 If the environmental baseline were to be similar to the current situation, then the impacts of decommissioning of the Project could be expected to be similar to the anticipated impacts of construction, without the impacts of piling. There is no reason to suppose that the impacts of decommissioning will cause an adverse effect on site integrity and on this basis, the Secretary of State considers that it is reasonable not to include a detailed discussion on decommissioning impacts in this report. He is satisfied that decommissioning effects will be addressed fully by the relevant authorities, prior to decommissioning and in light of more detailed information on decommissioning processes and environmental conditions at that time.

Development location and designated sites

Location

3.1 The Hornsea Zone is located in the southern region of the North Sea, covering an area of 4,735 km² (Figure 2). The western boundary of the Hornsea Zone is 31 km from the coastline of the East Riding of Yorkshire and the eastern boundary is 1 km from the median line between UK and Dutch waters.

Figure 2 Location of the Project within the Hornsea Zone (Smart Wind ES: 7.1.3 Project Description)



3.2 The Project is located within the Hornsea Zone (indicated with a red dotted line in Figure 2). The Project area is indicated in green in Figure 2.

3.3 The location of the export cable landfall is shown in Figure 3.

3.4 The location of the onshore cable route corridor is indicated by a red line in Figure 4.

Figure 3 Indicative location of export cable landfall at Horseshoe Point, Lincolnshire (Smart Wind HRA: Part 1)

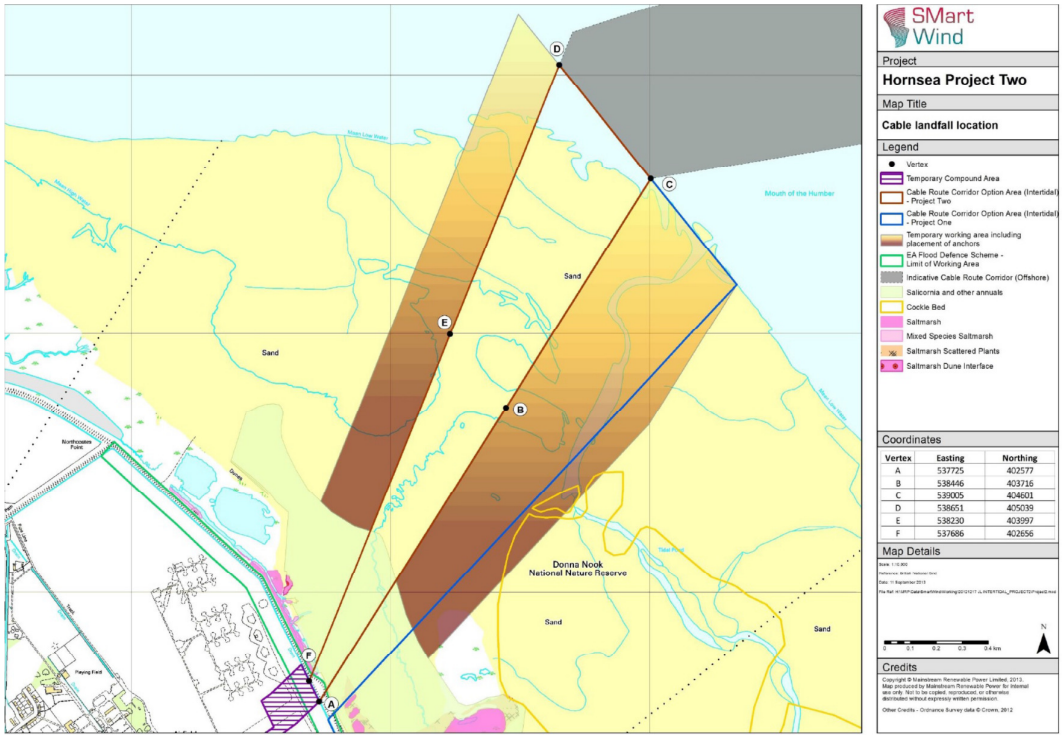
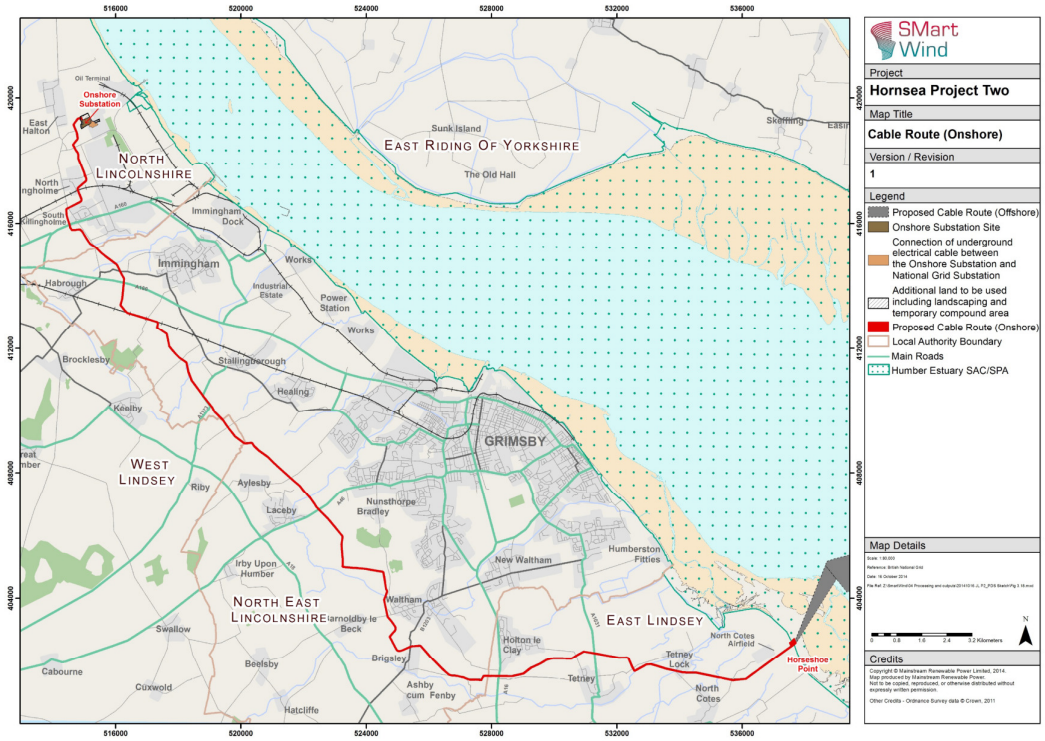


Figure 4 Location of the onshore cable route corridor (Smart Wind ES: 7.1.3 Project Description)



European and International Sites

3.5 The project is not connected with or necessary to the management of nature conservation for any European Site.

3.6 The RIES sought to reflect the evolving material and the positions of various parties on the main issues considered within the HRA process. It identifies the European sites, the likely impacts of the Project on those sites, and mitigation measures as proposed up to the point that the RIES was released for consultation. The completed report was made available for comment, and a number of bodies submitted responses to it: the Applicant [REP7-017], NE [REP7-034] and the RSPB [REP8-005].

3.7 The Applicant identified 77 European sites for which the UK is responsible for inclusion within the assessment. The Applicant later provided HRA addenda covering two additional proposed sites) identified for inclusion within the assessment:

The Southern North Sea possible SAC:

3.8 In their relevant representation, NE highlighted the possibility that a formal consultation on possible SACs to be designated for harbour porpoise would begin in summer 2015. They advised that once the formal consultation had begun, impacts on the proposed features of sites would become a material consideration in relation to the HRA of the application. In response to a question from the ExA, drawing the Applicant's attention to the approach taken by the Secretary of State on Dogger Bank Teesside A and B wind farm, the applicant submitted a HRA Addendum for the Southern North Sea dSAC (REP4-026). During the Recommendation stage of the planning process, on 19th January 2016, consultation on a Southern North Sea SAC was published[7] and the site became a possible SAC (pSAC).

3.9 During consideration of the Application the Secretary of State issued a number of consultations regarding the Southern North Sea pSAC. The consultations and the responses received are discussed in more detail in later sections. All submissions received have informed the conclusions of this HRA.

The Greater Wash possible SPA:

3.10 NE wrote to the ExA on 10 September 2015 to draw their attention to the informal consultation that had begun on 7 September 2015 on the Greater Wash possible SPA. Part of the cable route for the application would run through the boundaries of the possible SPA as currently proposed. Although noting that the site would not become a material consideration for this application until formal consultation begins, NE recommended that the potential impacts should be considered in a draft HRA to 'future proof' against the risk of any permission being reviewed after the SPA has been classified.

3.11 The Applicant provided a shadow HRA screening for the Greater Wash possible SPA. The Applicant's position was that, as there was yet to be formal consultation on this site, it does not

[7] http://jncc.defra.gov.uk/SACconsultation

constitute a material planning consideration. It did, however, provide the information in case formal consultation began before the decision-making process was completed [REP7-017].

3.12 The Greater Wash SPA consultation was not published within the Secretary of State's decision period. Final details of the site's features and conservation objectives are not yet available on which to make a complete HRA assessment. Despite this the Secretary of State has considered the Applicant's shadow HRA, the representations provided by NE and the Royal Society for the Protection of Birds ("RSPB") and the conclusions presented by the ExA. On review of the information currently available, the Secretary of State is content that the Project would not hinder the SPA from being designated in the future.

3.13 As a matter of policy, proposed sites, where formal consultation has begun, will be treated as if they have been formally designated or classified, from the point that they are a possible SAC or potential SPA. This is in accordance with government policy[8].

3.14 There is significant overlap between SPA, SAC and Ramsar designations, so for the purposes of this assessment; the features of the Ramsar designations are considered in parallel with the corresponding features of the SPA or SAC designations.

3.15 All European sites identified for screening by the Applicant and NE are summarised at Annex 1 of the RIES[9] and so have not been duplicated here.

3.16 The Applicant also identified the potential for the Project to affect a number of European sites located in other countries, known as transboundary sites. The potential impacts upon these sites are considered in more detail within the transboundary section of the report (section 18).

[8] National Planning Policy Framework (paragraph 118): www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf

[9] http://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/2.%20Post-Submission/EIA/Habitat%20Regulations/Report%20on%20the%20Implications%20for%20European%20sites.pdf

Likely Significant Effects Test

4.0 Under regulation 61 of the Habitats Regulations and regulation 25 of the Offshore Habitats Regulations, the Secretary of State must consider whether a development will have a LSE on a European site, either alone or in-combination with other plans or projects. A LSE is, in this context, any effect that may be reasonably predicted as a consequence of a plan or project that may affect the conservation objectives of the features for which the site was designated, but excluding trivial or inconsequential effects. An AA is required if a plan or project is likely to have a significant effect on a European site, either alone or in-combination with other plans or projects.

4.1 The purpose of this test is to identify LSEs on European sites that may result from the Project and to record the Secretary of State's conclusions on the need for an AA and his reasons for including activities, sites or plans and projects for further consideration in the AA. For those features where a LSE is identified, these must be subject to an AA. This review of potential implications can be described as a 'two-tier process' with the LSE test as the first tier and the review of effects on integrity (AA) as the second tier.

4.2 This section addresses this first step of the HRA, for which the Secretary of State has considered the potential impacts of the Project both alone and in-combination with other plans and projects on each of the interest features of the European sites identified in the RIES to determine whether or not there will be a LSE.

4.3 The RIES compiles, documents and signposts information submitted throughout the examination by both the Applicant and Interested Parties. The RIES sets out the UK European sites identified and considered during the examination and presents the potential interactions of each stage of the Development (construction, operation, decommissioning) with the qualifying features of those sites.

4.4 The RIES is issued to ensure that interested parties, including the SNCBs, are consulted formally on Habitats Regulations matters as required under regulations 61(3) and 25(3). The Secretary of State accepts the ExA's recommendation that the process may be relied on for the purposes of Regulation 61(3) of the Habitats Regulations and regulation 25(3) of the Offshore Habitats Regulations.

4.5 As noted, 79 European sites were identified for inclusion within the assessment of LSE. These sites are listed in Annex 1 of the RIES. Of these 79 sites identified by the Applicant and NE, the Applicant concluded that significant effects were likely for 11 sites and their qualifying features either alone or in-combination:

- Flamborough and Filey Coast pSPA (FFC pSPA)[10]
- Flamborough Head and Bempton Cliffs SPA (FHBC SPA)
- Forth Islands SPA

[10] The pSPA extends the Flamborough Head and Bempton Cliffs SPA boundary and list of qualifying bird features

- Fowlsheugh SPA
- Humber Estuary SPA
- Humber Estuary Ramsar
- Humber Estuary SAC
- Berwickshire and North Northumberland Coast SAC
- River Derwent SAC
- The Wash and North Norfolk Coast SAC
- Southern North Sea pSAC

4.6 The Applicant concluded that likely significant effects could be excluded alone and in-combination with other plans or projects for the Greater Wash possible SPA provided best practice and good practice protocols are implemented to avoid disturbance to birds from vessel movements [REP4-041]. NE and the RSPB however raised concerns about possible impacts on rafting red-throated diver and common scoter from increased vessel movements [REP3-033] and NE appears to imply in its comments on the RIES that it does not agree with the Applicant's conclusion of no likely significant effect on these species [REP7-034]. As noted above The Greater Wash SPA consultation was not published within the Secretary of State's decision period. Final details of the site's features and conservation objectives are not yet available on which to make a complete HRA assessment. Despite this the Secretary of State has considered the Applicant's shadow HRA, the representations provided by NE and the Royal Society for the Protection of Birds ("RSPB") and the conclusions presented by the ExA. On review of the information currently available, the Secretary of State is content that the Project would not hinder the SPA from being designated in the future and has not considered the site further in this Assessment.

4.7 In total therefore, the Applicant and other Interested Parties concluded that there is the potential for a LSE on 12 of the 79 European sites either alone or in-combination and these conclusions, alongside the comments and advice of Interested Parties are summarised in the RIES. Comments were provided on the RIES by the Applicant, NE and RSPB and these have been taken into account, alongside the RIES, in the Secretary of State's assessment of LSE. As noted above in paragraph 3.12 the Secretary of State has not considered the Greater Wash possible SPA further in this assessment and so has considered 11 European sites in more detail.

4.8 NE stated that they are satisfied that all of the relevant designated sites and features have been sufficiently considered in the Applicant's assessment (REP3-033, para 1.10). No other UK European sites or site features were identified for inclusion in the HRA in the relevant representations from any other Interested Party including RSPB, The Wildlife Trust (TWT), or Lincolnshire Wildlife Trust (LWT) (RIES: 2.7; ExA: 6.3.9).

4.9 The Secretary of State notes that during the Recommendation period, on 21st January 2016, Government launched a consultation[11] into extending a European site, Hamford Water pSPA. Hamford Water SPA is located on the Essex coast 213 km south of the Project, and is designated for a breeding population of little tern and wintering populations of avocet, dark bellied-brent goose, shelduck, teal, ringed plover, grey plover, black-tailed godwit and redshank. The extension to the SPA has been proposed to afford protection to foraging areas for little tern and to update to the little tern breeding population. To ensure that interested parties had the opportunity to provide any additional information on the likely significant effect on this site in light of the extension and changes to the site, the Secretary of State wrote to all interested parties on 7th April 2016[12]. Responses that related to ornithology were received from NE[13], the Applicant[14], and RSPB[15].

4.10 The Applicant responded that no impact pathway exists between the pSPA and the Project due to the site being 213km away from the Project, which is beyond the mean maximum foraging range of the species, of 6km. It stated that the conclusions of no likely significant effect drawn as part of the HRA screening process remained valid.

4.11 RSPB responded that on the basis of the distance from the proposed SPA extension to the Project's location and cabling route the RSPB is satisfied that there will not be a likely significant effect upon the proposed extension to the Hamford Water SPA and its species.

4.12 NE advise that, based on the available evidence, it continues to advise that the project does not pose a Likely Significant Effect on the Hamford Water pSPA, either alone or in-combination with other plans or projects.

4.13 The Secretary of State is content that on the advice of all parties, the Project will not create a Likely Significant Effect on the Hamford Water pSPA and he has therefore screened it out from further assessment.

Likely Significant Effects

4.14 The Secretary of State has considered the potential construction and operational impacts of the Project on all relevant interest features to determine whether there will be LSE in the context of the Habitats and the Offshore Habitats Regulations. As noted the Secretary of State recognises that powers are in place for decommissioning effects to be addressed fully by the relevant authorities, prior to decommissioning and in light of more detailed information on decommissioning processes and environmental conditions at that time. He therefore considers that it is reasonable not to include a detailed discussion on decommissioning impacts in this

[11] https://www.gov.uk/government/consultations/hamford-water-special-protection-area-extension-comment-on-proposals

[12] http://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/2.%20Post-Submission/DECC%20Consultation/Department%20for%20Energy%20and%20Climate%20Change%20consultation%20letter%20dated%207%20April%202016.pdf

[13] http://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/2.%20Post-Submission/DECC%20Consultation/Natural%20England.pdf

[14] http://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/2.%20Post-Submission/DECC%20Consultation/Dong%20-%20Hornsea%20Project%202%20-%201.pdf

[15] http://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/2.%20Post-Submission/DECC%20Consultation/RSPB.pdf

report and notes that decommissioning is not a barrier to the development being granted development consent.

Potential Impacts

4.15 The key potential impacts considered within the Secretary of State's test for LSE are:

- Bird collision risk and displacement during the operational phase.
- Bird disturbance during construction and decommissioning.
- Marine mammal disturbance from underwater piling noise during construction.
- Disturbance to coastal habitats and changes to water quality at estuarine habitats during construction.
- Impacts upon fish from electromagnetic fields during operation and changes to water quality during construction.

4.16 Table 1 below taken from the ExA report summarises European sites where the project is likely to give rise to significant effects, either alone or in-combination with other plans and projects. The sites and features shown in Table 1 and the Secretary of State's conclusions upon LSE are then described in further detail below.

Table 1: European sites where the project is likely to give rise to significant effects (LSE), either alone or in-combination with plans or projects on the listed qualifying features (Table 6.2 ExA's Report). In the table x means a likely significant effect was identified.

European Site	Features identified as having LSE	Impact Type	LSE Alone	LSE In-Combination
Flamborough and Filey Coast pSPA	Gannet	Collision and displacement during the operational phase	**x**	**x**
	Kittiwake	Collision during the operational phase	**x**	**x**
	Auk Species (guillemot, razorbill and puffin)	Displacement during the operational phase.	**x**	**x**
	Fulmar	Displacement during the operational phase	**x**	**x**
Flamborough Head and Bempton Cliffs SPA	Kittiwake	Collision during the operational phase	**x**	**x**
Forth Islands SPA	Fulmar	Displacement during the operational phase	**x**	**x**
Fowlsheugh SPA	Fulmar	Displacement during the operational phase	**x**	**x**
Humber Estuary SPA	Article 4.1 qualification: Breeding: Avocet and marsh harrier Winter: Bar-tailed godwit, hen harrier, avocet and golden plover Passage: Ruff Article 4.2 qualification (migratory species) Over winter: Dunlin, knot and redshank	Disturbance to birds using the intertidal zone during construction and decommissioning	**x**	**x**

	On passage: Dunlin, knot, black tailed godwit and redshank Assemblage: Dark bellied brent goose, sanderling, dunlin, knot, ringed plover, oystercatcher, bar-tailed godwit, golden plover, grey plover, teal, wigeon, mallard, turnstone, pochard, greater scaup, bittern, goldeneye, black-tailed godwit, curlew, whimbrel, ruff, avocet, greenshank, lapwing, redshank.			
Humber Estuary Ramsar	Internationally important assemblage of waterfowl during the non-breeding season	Disturbance to birds using the intertidal zone during construction and decommissioning	**x**	**x**
	Internationally important populations of breeding, wintering and on passage waders and waterfowl		**x**	**x**
	Coastal habitats and estuarine waters	Disturbance during construction Changes to water quality during construction from increased suspended sediment concentrations and sediment deposition	**x**	**x**
	River lamprey and sea lamprey	Changes to water quality during construction from increased suspended sediment concentrations and sediment deposition Electro-magnetic fields during operation	**x**	**x**
	Grey seal	Disturbance from underwater piling noise during construction	**x**	**x**
Humber Estuary SAC	Annex 1 coastal habitats and estuaries	Disturbance during construction Changes to water quality during construction from increased suspended sediment concentrations and sediment deposition	**x**	**x**

	River lamprey and sea lamprey	Changes to water quality during construction from increased suspended sediment concentrations and sediment deposition Electro-magnetic fields during operation	**x**	**x**
	Grey seal	Disturbance from underwater piling noise during construction	**x**	**x**
Berwickshire and North Northumberl and Coast SAC	Grey seal	Disturbance from underwater piling noise during construction	**x**	**x**
River Derwent SAC	River lamprey and sea lamprey	Changes to water quality during construction from increased suspended sediment concentrations and sediment deposition Electro-magnetic fields during operation	**x**	**x**
The Wash and North Norfolk Coast SAC	Harbour seal	Disturbance from underwater piling noise during construction	**x**	**x**
Southern North Sea pSAC	Harbour porpoise	Disturbance from underwater piling noise during construction	**x**	**x**

Flamborough and Filey Coast pSPA

4.17 The Flamborough and Filey Coast potential SPA (pSPA) (hereafter FFC pSPA) is located on the Yorkshire coast between Bridlington and Scarborough. The cliffs of Flamborough Head rise to 135 metres and are composed of chalk and other sedimentary rocks. The site supports large numbers of breeding seabirds including kittiwake, guillemot, razorbill, and puffin as well as the only mainland-breeding colony of gannet in the UK. The seabirds feed and raft in the waters around the cliffs, outside the SPA, as well as feeding more widely in the North Sea.

4.18 This pSPA is a proposed geographical extension to the existing Flamborough Head to Bempton Cliffs SPA (hereafter FHBC SPA) and would add several species to the formal citation.

4.19 A likely significant effect upon the FFC pSPA was identified because of the potential for the Project, both alone and in-combination with other plans and projects, to lead to collision and displacement risk to gannet, collision risk to kittiwake and displacement risk to razorbill, guillemot, puffin, and fulmar.

4.20 **The Secretary of State agrees with the Applicant, NE and the ExA that there is a likely significant effect on the FFC pSPA due to the potential for the operational array both alone and in-combination with other plans and projects, to lead to collision and displacement risk to gannet, collision risk to kittiwake and displacement risk to razorbill, guillemot, puffin and fulmar interest features of the site.**

Flamborough Head and Bempton Cliffs SPA

4.21 Flamborough Head is located on the central Yorkshire coast of eastern England. The site supports large numbers of breeding seabirds including kittiwake and auks, as well as the only mainland-breeding colony of gannet in the UK. The seabirds feed and raft in the waters around the cliffs, outside the SPA, as well as feeding more widely in the North Sea. The intertidal chalk platforms are also used as roosting sites, particularly at low water and notably by juvenile kittiwakes.

4.22 A likely significant effect upon the FHBC SPA was identified because of the potential for the Project, both alone and in-combination with other plans and projects, to lead to collision risk to kittiwake during the operational phase.

4.23 **The Secretary of State agrees with the Applicant, NE and the ExA that there is a likely significant effect on the FHBC SPA due to the potential for the operational array, both alone and in-combination with other plans and projects, to cause collision and displacement to the kittiwake interest features of the site.**

Forth Islands SPA

4.24 The Firth of Forth Islands are located in or near to the Firth of Forth on the east coast of central Scotland. The SPA comprises a number of separate islands or island groups, principally Inchmickery (together with the nearby Cow and Calves) off Edinburgh, Fidra, Lamb and

Craigleith together with the Bass Rock off North Berwick, and the much larger Isle of May in the outer part of the Firth. The site also includes additional other small islands.

4.25 The islands support important numbers of a range of breeding seabirds, in particular terns, auks and gulls. The seabirds feed outside the SPA in nearby waters, as well as more distantly in the North Sea.

4.26 The proposed offshore windfarm site is located outside of the Forth Islands SPA but the Applicant identified that fulmar, a species that makes up part of the seabird assemblage feature, could be impacted while foraging in the array.

4.27 A likely significant effect upon the Forth Islands SPA site was identified because of the potential for the operational array to cause displacement of fulmar in the breeding, pre-breeding, post-breeding and non-breeding seasons. A likely significant effect was also initially identified due to collision risk; however, this was later screened out by the Applicant due to the fact that all 1045 fulmars recorded in flight during baseline surveys of Subzone 2 were not once observed to fly above minimum rotor height.

4.28 **The Secretary of State considers that there is a likely significant effect on the Forth Islands SPA due to the potential for the operational array, both alone and in-combination with other plans and projects, to cause displacement of fulmar in the breeding, pre-breeding, post-breeding and non-breeding seasons.**

Fowlsheugh SPA

4.29 Fowlsheugh is located on the east coast of Aberdeenshire in north-east Scotland, overlooking the North Sea. The sheer cliffs are between 30-60 m high and are cut mostly in basalt and conglomerate of Old Red Sandstone age. They form a rock face with diverse structure providing ideal nesting sites for seabirds. The cliffs support major numbers of breeding seabirds, especially gulls and auks. The seabirds feed outside the SPA in nearby waters, as well as more distantly in the North Sea.

4.30 The proposed offshore windfarm site is located outside of the Fowlsheugh SPA but the Applicant identified that fulmar, a species that makes up part of the seabird assemblage feature, could be impacted while foraging in the array.

4.31 A likely significant effect upon the Forth Islands SPA site was identified because of the potential for the operational array to cause displacement of fulmar in the breeding, pre-breeding, post-breeding and non-breeding seasons. A likely significant effect was also initially identified due to collision risk; however, this was later screened out by the Applicant due to the fact that all 1045 fulmars recorded in flight during baseline surveys of Subzone 2 were not once observed to fly above minimum rotor height.

4.32 **The Secretary of State considers that there is a likely significant effect on the Fowlsheugh SPA due to the potential for the operational array, both alone and in-**

combination with other plans and projects, to cause displacement of fulmar in the breeding, pre-breeding, post-breeding and non-breeding seasons.

Humber Estuary SPA and Ramsar

4.33 The Humber Estuary SPA and Ramsar site protects the avian interest features (and their supporting habitats) of the Humber Estuary. The extensive mudflats and saltmarsh provide important habitats for many species of birds.

4.34 The proposed offshore windfarm is located outside of the Humber Estuary SPA and Ramsar site, but the landfall of the export cable passes through the sites.

4.35 A likely significant effect upon the Humber Estuary SPA and Ramsar site was identified because of the potential for construction works, where the export cable comes onshore, to cause disturbance and displacement of waterbird species. NE and the RSPB also considered there to be a likely significant effect because of the potential for operation and maintenance activities to cause disturbance and displacement of waterbird species.

4.36 **The Secretary of State agrees with the Applicant, the ExA and NE that there is a likely significant effect on the Humber Estuary SPA and Ramsar. The Secretary of State considers there is a likely significant effect due to the potential for construction works and operation and maintenance activities, both alone and in-combination with other plans and projects to cause disturbance and displacement of waterbird species where the export cable comes ashore.**

Humber Estuary SAC and Ramsar

4.37 The Humber is the second largest coastal plain Estuary in the UK, and the largest coastal plain estuary on the east coast of Britain. The estuary supports a full range of saline conditions from the open coast to the limit of saline intrusion on the tidal rivers of the Ouse and Trent. The range of salinity, substrate and exposure to wave action influences the estuarine habitats and the range of species that utilise them (JNCC 2016).

4.38 Habitats within the Humber Estuary include; Atlantic salt meadows and a range of sand dune types in the outer estuary, together with subtidal sandbanks (Sandbanks which are slightly covered by sea water all the time), extensive intertidal mudflats (Mudflats and sandflats not covered by seawater at low tide), glasswort beds (*Salicornia* and other annuals colonising mud and sand), and coastal lagoons.

4.39 Significant fish species include river lamprey, *Lampetra fluviatilis,* and sea lamprey, *Petromyzon marinus*. Grey seals, *Halichoerus grypus,* come ashore in autumn to form breeding colonies on the sandy shores of the south bank at Donna Nook.

4.40 The proposed offshore windfarm is located outside of the Humber Estuary SAC and Ramsar site, but the landfall of the export cable passes through the sites.

4.41 Likely significant effects were identified for a number of Annex I habitat features of the Humber Estuary SAC and Ramsar associated with temporary disturbance/loss of habitat and increased

suspended sediment concentrations and deposition during construction. The features potentially affected were: "Estuaries", "Mudflats and sandflats not covered by seawater at low tide", "Coastal lagoons", "*Salicornia* and other annuals colonising mud and sand", "Atlantic salt meadows (*Glauco-Puccinellietalia maritimae)", "*Embryonic shifting dunes" and "Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")". NE also expressed concerns about access during construction & operation.

4.42 Likely significant effects were also identified on Annex II migratory fish species of the Humber Estuary SAC and Ramsar associated with increased suspended sediment concentrations and deposition during construction and electro-magnetic field ("EMF") related effects during operation and maintenance. The species potentially impacted were sea and river lamprey.

4.43 Likely significant effects on Annex II marine mammal species at a number of UK and transboundary sites were identified associated with piling activity during construction. The Humber Estuary SAC supports the second largest breeding grey seal colony in England at Donna Nook, concerns were raised by NE about the impacts of construction activity on the seal population.

4.44 **The Secretary of State agrees with the Applicant, the ExA and NE that there is a likely significant effect on the Humber Estuary SAC and Ramsar (both alone and in-combination with other plans and projects) due to temporary disturbance/loss of habitat and increased suspended sediment concentrations and deposition during construction, construction noise impacts and electro-magnetic field related effects during operation and maintenance. The features of the sites potentially affected are Annex I habitats, river lamprey, sea lamprey and grey seal.**

Berwickshire and North Northumberland Coast SAC

4.45 The site covers an extensive and diverse stretch of coastline in north-east England and south-east Scotland. There is variation in the distribution of features of interest along the coast. The north-east England coastal section is representative of grey seal *Halichoerus grypus* breeding colonies in the south-east of its breeding range in the UK. It is the most south-easterly site selected for this species, and supports around 2.5% of annual UK pup production.

4.46 The proposed offshore windfarm site is located outside of the Berwickshire and North Northumberland Coast SAC. Likely significant effect was identified for grey seal at the site due to piling activity during construction.

4.47 **The Secretary of State agrees with the Applicant that there is a likely significant effect on the Berwickshire and North Northumberland Coast SAC, both alone and in-combination with other plans and projects, due to construction noise. The features of the site potentially affected are grey seal.**

River Derwent SAC

4.48 The River Derwent SAC represents one of the best British examples of the classic river profile, with its source in the high-energy upland valleys of the North York Moors whose energy dissipates as the channel becomes wider and deeper as it passes through the flat and wide lowland floodplain valleys to its confluence with the Ouse and out into the Humber Estuary. Only the lower reaches of the river are designated as a SAC.

4.49 The proposed offshore windfarm site is located outside of the River Derwent SAC but the Applicant identified that migratory fish features of the SAC (river lamprey and sea lamprey) could be impacted on their migration route to the River Derwent SAC. A likely significant effect was identified on river and sea lamprey of the River Derwent SAC associated with increased suspended sediment concentrations and deposition during construction and electro-magnetic field ("EMF") related effects during operation and maintenance of the Project.

4.50 **The Secretary of State agrees with the Applicant, NE and the ExA that there is a likely significant effect on the River Derwent SAC, both alone and in-combination with other plans and projects due to increased suspended sediment concentrations and deposition during construction and electro-magnetic field related effects during operation and maintenance. The features of the site potentially affected are river lamprey and sea lamprey.**

The Wash and North Norfolk Coast SAC

4.51 The Wash is the largest embayment in the UK. It is connected via sediment transfer systems to the north Norfolk coast. Together, the Wash and North Norfolk Coast form one of the most important marine areas in the UK and European North Sea coast, and include extensive areas of varying, but predominantly sandy, sediments subject to a range of conditions (Natural England, 2014). The extensive intertidal flats on the Wash and on the North Norfolk Coast provide ideal conditions for Harbour seal *Phoca vitulina* breeding and hauling-out.

4.52 The proposed offshore windfarm site is located outside of the Wash and North Norfolk Coast SAC. Likely significant effect was identified for harbour seal at the site due to piling activity during construction.

4.53 **The Secretary of State agrees with the Applicant that there is a likely significant effect on the Wash and North Norfolk Coast SAC, both alone and in-combination with other plans and projects due to construction noise. The features of the site potentially affected are harbour seal.**

Southern North Sea pSAC

4.54 The Secretary of State notes that since the close of the examination of the Project, Government has launched the consultation into possible Special Areas of Conservation (pSAC) for Harbour Porpoise: this includes the Southern North Sea pSAC. The consultation ran between 19th

January 2016 and 3rd May 2016. The Secretary of State will therefore consider the Southern North Sea pSAC within this HRA.

4.55 The Southern North Sea pSAC is proposed for designation for the Annex II species harbour porpoise (*Phocoena phocoena*). This is a single feature site, proposed to be designated solely for the purpose of aiding the management of harbour porpoise populations throughout UK waters, in accordance with EU legislation. The site includes parts of both territorial waters (from the coast out to 12 nautical miles) and offshore waters (from 12 nautical miles from the coast out to 200 nautical miles or to the UK Continental Shelf limit).

4.56 The Southern North Sea site is located in the North Sea Management Unit ("MU") and has been recognised as an area with predicted persistent high densities of harbour porpoise. The main area included within the site covers important winter and summer habitat, which emerged as part of the top 10% persistent high density areas for these seasons within the UK. Approximately two thirds of the site, the northern part, is recognised as important for porpoises during the summer season, whilst the southern part is more important during the winter (JNCC, NE SAC Selection document).

4.57 Following the close of Examination the Secretary of State sought further information in a number of consultations from the Applicant, NE, JNCC and other Interested Parties into the potential impacts of the Project on the Southern North Sea pSAC.

4.58 The Applicant's response of 21 April 2016 noted that "it remains the conclusion [of the Applicant] that the only potential for LSE in relation to the Project either alone or in-combination is that of disturbance from underwater noise associated with percussive piling during the construction phase."

4.59 The joint response of NE and JNCC of the 13 May 2016 stated "Natural England and JNCC advise that there will be a likely significant effect on the Southern North Sea pSAC. With regards to Hornsea Project 2 the issue under consideration is significant disturbance. In terms of disturbance, the key impact for the Hornsea Project 2 HRA to assess is underwater impulsive noise within the Southern North Sea pSAC."

4.60 **Based on the advice received the Secretary of State agrees with the Applicant, NE and JNCC that there is a likely significant effect on the Southern North Sea pSAC, both alone and in-combination with other plans and projects, due to disturbance of harbour porpoise as a result of construction of the project.**

Likely Significant Effects: Development Alone

4.61 The Secretary of State agrees with the recommendations of the ExA, and the views of the Applicant and NE, and concludes that likely significant effects cannot be excluded at the 11 European sites listed in Table 1, when the Project is considered alone.

4.62 These sites are taken forward to the AA to consider whether the Project will result in an adverse effect upon the integrity of these sites.

4.63 For information about the reasons why a LSE alone was excluded from the remaining 67 sites the reader is invited to refer to the published RIES for the Project. The Secretary of State is satisfied with the decision to exclude a LSE from these sites and has adopted these conclusions for the purposes of the HRA.

Likely Significant Effects: In-Combination

Scope of in-combination assessment

4.64 Under the Habitats Regulations and the Offshore Habitat Regulations, the Secretary of State is obliged to consider whether other plans or projects in-combination with the Project might affect European sites. In this case there are a number of other plans and projects which could potentially affect some of the same European sites. The approach used by the Applicant to assess in-combination effects was to select projects which may affect the designated site feature under consideration. The plans and projects included in the assessment include a number of planned and existing offshore wind farms within the vicinity of the Project and a number of projects expected to affect coastal habitats, for example works to extract aggregates, or lay cables or pipelines.

Table 2 Plans and Projects included in the Applicant's in-Combination assessment (Source: RIES Annex 2)

Annex 1 Habitats in the Humber Estuary	
Habitat loss/disturbance	Hornsea offshore wind farm Project One Able Marine Energy Park Phillips66 replacement pipeline
Migratory fish in the Humber Estuary SAC/Ramsar and River Derwent SAC	
Increased suspended sediment concentrations and sediment deposition	Licensed aggregate extraction areas (i.e., Area 514/2, 514/4, Area 197, Area 160/1, 106/2, 106/3 and Area 480); Application aggregate extraction areas (i.e., Area 514/1, Area 514/3, Area 493, Area 506 and Area 490) Consented offshore wind farm projects (i.e., Triton Knoll); Submitted offshore wind farm projects (i.e., Project One).
Electro-magnetic fields	Humber Gateway export route Lincs offshore wind farm Sheringham Shoal offshore wind farm Dudgeon East offshore wind farm Race Bank offshore wind farm Triton Knoll offshore wind farm Westernmost Rough offshore wind farm Hornsea offshore wind farm project one
Marine mammals	
Impact of piling noise on seals	Hornsea offshore windfarm Project One Race Bank offshore wind farm Triton Knoll offshore wind farm East Anglia ONE offshore wind farm Dogger Bank Creyke Beck A and B offshore wind farm Dogger Bank Teesside A and B offshore wind farm

	East Anglia THREE offshore windfarm
Impacts of piling noise on harbour porpoise	Hornsea offshore windfarm Project One Race Bank offshore wind farm Westernmost Rough offshore wind farm Triton Knoll offshore wind farm Dudgeon offshore wind farm East Anglia ONE offshore wind farm Dogger Bank Creyke Beck A and B offshore wind farm Blythe demonstration site Dogger Bank Teesside A and B offshore wind farm East Anglia THREE offshore windfarm
Fulmar	
Displacement effects	Hornsea offshore wind farm Project One Inch Cape offshore wind farm
Gannet	
Displacement effects	Dogger Bank Creyke Beck A and B offshore wind farm Dogger Bank Teesside A and B offshore wind farm Hornsea offshore wind farm Project One
Collision mortality	Aberdeen European Offshore Wind Deployment Centre Beatrice Demonstration Project Blyth Demonstration Project Dogger Bank Creyke Beck A and B offshore wind farm Dogger Bank Teesside A and B offshore wind farm Dudgeon offshore wind farm East Anglia ONE offshore wind farm Galloper offshore wind farm Greater Gabbard offshore wind farm Hornsea offshore wind farm project one Humber Gateway offshore wind farm Inch Cape offshore wind farm Kentish Flats Extension offshore wind farm Lincs offshore wind farm London Array offshore wind farm Moray Firth project one offshore wind farm Neart na Gaoithe offshore wind farm Race Bank offshore wind farm Seagreen Alpha offshore wind farm Seagreen Bravo offshore wind farm Sheringham Shoal offshore wind farm Teesside offshore wind farm Thanet offshore wind farm Triton Knoll offshore wind farm Westernmost Rough offshore wind farm
Kittiwake	
Collision mortality (based on **REP4-039,Table 1.13**)	Blyth Demonstration Project Dogger Bank Creyke Beck Projects A and B offshore wind farm Dogger Bank Teesside Projects A and B offshore wind farm Dudgeon offshore wind farm Humber Gateway offshore wind farm Hornsea Project One offshore wind farm Lincs offshore wind farm offshore wind farm

	Teesside offshore wind farm Triton Knoll offshore wind farm Westernmost Rough offshore wind farm
Guillemot	
Displacement effects	As for gannet collision mortality assessment plus the following offshore wind farms: LID6 London Array I and II
Razorbill	
Displacement effects	As for gannet collision mortality assessment plus LID 6 and London Array II
Puffin	
Displacement effects	As for razorbill displacement effects assessment

4.65 In assessing impacts specifically upon ornithological receptors, the Applicant has taken a tiered approach to considering other projects in-combination. As different projects are at different stages of development, there are variable levels of information and certainty available on the predicted environmental impacts. For this reason other plans and projects are grouped according to their development status, into 'tiers'. By grouping the projects into tiers, the Applicant is able to place greater weight on those which are operational, under construction or consented and less weight on projects in planning for which there are variable amounts of information available. This approach is discussed in this report under the relevant ornithological AA sections.

Likely significant effect: In-combination assessment

4.66 The Secretary of State agrees with the recommendations of the ExA, and the views of the Applicant and NE, and concludes that that a LSE cannot be excluded at the 11 European sites listed in Table 1 when the impacts of the Project are considered in-combination with other plans and projects.

4.67 These sites are taken forward to the AA to consider whether the Project in-combination with other plans and projects will result in an adverse effect upon the integrity of these sites.

4.68 For information about the reasons why a LSE was excluded from the remaining 68 sites, the reader is invited to refer to the published RIES for the Project. The Secretary of State is satisfied with the decision to exclude a LSE from these sites and has adopted these conclusions for the purposes of the HRA.

Conclusions on Likely Significant Effects

4.69 The Secretary of State considers that sufficient information has been provided to inform a robust assessment in line with his duties under the Habitats Regulations and the Offshore Habitats Regulations.

4.70 On the basis of the information presented in the RIES and the responses to that document, the ExA concludes that the Project is likely to have a significant effect upon the 11 sites (and features) listed in Table 1, both alone and in-combination.

4.71 The Secretary of State is satisfied to rely on the recommendations of the ExA, the RIES, and written responses to it to inform his view. He considers that the evidence behind these judgements has been fully tested as part of the examination process. Having given due consideration to the information and analysis presented to him, the Secretary of State is in agreement with the ExA and is unable to exclude LSEs from the 11 sites identified in Table 1.

4.72 The Secretary of State agrees with the ExA that there are no other LSEs on any of the other interest features of the sites listed in Annex 1 of the RIES as a result of the Development, either alone or in-combination with other plans or project

Appropriate Assessment

Test for Adverse Effect on Site Integrity

5.0 The requirement to undertake an AA is triggered when a competent authority, in this case the Secretary of State, determines that a plan or project is likely to have a significant effect on a European site either alone or in-combination with other plans or projects. Guidance issued by the European Commission states that the purpose of an AA is to determine whether adverse effects on the integrity of the site can be ruled out as a result of the plan or project, either alone or in-combination with other plans and projects, in view of the site's conservation objectives (European Commission, 2000).

5.1 The purpose of this AA is to determine whether or not adverse effect on integrity of those sites and features identified during the LSE test can be ruled out as a result of the Project alone or in-combination with other plans and projects in view of the site's conservation objectives and using the best scientific evidence available.

5.2 If the competent authority cannot ascertain the absence of an adverse effect on integrity within reasonable scientific doubt, then under the Habitats Regulations and the Offshore Habitats Regulations, alternative solutions should be sought. In the absence of an acceptable alternative, the project can proceed only if there are imperative reasons of overriding public interest ("IROPI") and suitable compensation measures identified. Considerations of IROPI and compensation are beyond the scope of an AA.

Conservation Objectives

5.3 Guidance from the European Commission indicates that disturbance to a species or deterioration of a European site must be considered in relation to the integrity of that site and its conservation objectives (European Commission, 2000). Section 4.6.3 of that guidance defines *s*ite integrity as:

> *…the coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and/or populations of species for which the site is or will be classified.*

5.4 Conservation objectives outline the desired state for a European site, in terms of the interest features for which it has been designated. If these interest features are being managed in a way which maintains their nature conservation value, they are assessed as being in a 'favourable condition'. An adverse effect on integrity is likely to be one which prevents the site from making the same contribution to favourable conservation status for the relevant feature as it did at the time of its designation (English Nature, 1997).

5.5 There are no set thresholds at which impacts on site integrity are considered to be adverse. This is a matter for interpretation on a site-by-site basis, depending on the designated feature and nature, scale and significance of the impact. Conservation objectives have been used by the Secretary of State to consider whether the Project has the potential for having an adverse effect

on integrity, either alone or in-combination. The potential for the Project to have an adverse effect on site integrity is next considered for each site in turn.

Flamborough and Filey Coast potential SPA

6.1 The Flamborough and Filey Coast (FFC) pSPA is located on the Yorkshire coast between Bridlington and Scarborough. The cliffs of Flamborough Head rise to 135 metres and are composed of chalk and other sedimentary rocks. The site supports large numbers of breeding seabirds including kittiwake, *Rissa tridactyla,* and auks (guillemot, *Uria aalge*; razorbill, *Alca torda;* and puffin, *Fratercula arctica*), as well as the only mainland-breeding colony of gannet, *Morus bassanus,* in the UK. The seabirds feed and raft in the waters around the cliffs, outside the SPA, as well as feeding more widely in the North Sea. The intertidal chalk platforms are also used as roosting sites, particularly at low water and notably by juvenile kittiwakes.

6.2 This pSPA is a proposed geographical extension to the existing FHBC SPA and would add several species to the formal citation. The pSPA consists of the following proposed changes to the existing FHBC SPA:

- A landward extension to the north west of the existing site to incorporate important breeding colonies of seabirds.
- Marine extensions out to 2 km to protect the waters which are important to these species of breeding birds.
- Modification of the landward boundary such that the features of the pSPA are protected in the future.

6.3 Formal consultation on the FFC pSPA was completed on 14 April 2014. The site is currently in the process of being classified as a SPA under the provisions of the Birds Directive. The proposals for the FFC pSPA comprise changes to the FHBC site boundary; the FFC pSPA covers 8,039.60ha across areas in the East Riding of Yorkshire, North Yorkshire and Scarborough, of which the marine extension covers 7,471.78ha. The proposals also include changes to the qualifying species such that the qualifying features would now be:

(i) In the breeding season:

- *Morus bassanus* Northern gannet
- *Rissa tridactyla* Black-legged kittiwake
- *Uria aalge* Common guillemot
- *Alca torda* Razorbill

(ii) Seabird assemblage in the breeding season of 215,750 birds including black-legged kittiwake, northern gannet, common guillemot, razorbill, northern fulmar, great cormorant, European shag, herring gull and Atlantic puffin.

6.4 It is Government policy to treat pSPAs as if they were a fully designated European site under the Habitats Regulations. As such, the Secretary of State considers it important to consider the potential impacts of the Project, both alone and in-combination with other plans or projects, upon this potential site.

6.5 NE published draft conservation objectives for FFC pSPA in November 2015 (NE, 2015). These are set out in Table 3 below. The wording of these conservation objectives is the same as the conservation objectives for FHBC SPA but apply to the new qualifying features.

6.6 NE state that the advice provided on the FFC pSPA also applies to the FHBC SPA [RR-021]. The Applicant also advised that its assessment and conclusions about effects on FFC pSPA also apply to FHBC SPA [REP3-014]. The ExA has considered the implications for both of these sites in view of the draft conservation objectives for FFC pSPA.

Table 3: Draft conservation Objectives for Flamborough and Filey Coast pSPA

Conservation Objectives	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; • The extent and distribution of the habitats of the qualifying features • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The population of each of the qualifying features, and, • The distribution of the qualifying features within the site.

Physical Damage

6.7 A likely significant effect upon the interest features of the site was identified because of the potential for the Project, both alone and in-combination with other plans and projects, to increase collision mortality and/or displacement mortality rates of a number of site qualifying features. The potential impacts upon each of the qualifying features are set out in Table 4.

Table 4: Impact upon each feature of the pSPA for which LSE was identified

Feature	Impact Type
Northern gannet	Collision risk and displacement during the operational phase
Black-legged kittiwake	Collision risk during the operational phase
Razorbill, common guillemot and puffin	Displacement during the operational phase
Fulmar	Displacement during the operational phase

6.8 The principal issues raised during the Examination with regard to ornithological collision and displacement impacts at the FFC pSPA and FHBC SPA relate to the relative merits of alternative methodological approaches to the assessment of those impacts. These include, in particular:

a. Baseline data
b. Collision Risk Modelling
c. Bird displacement rates
d. PBR and PVA sustainability assessment
e. Apportionment of effects to individual SPA colonies
f. Tiering and relevant projects for in-combination assessment

6.9 The principal issues of disagreement between the parties with regard to ornithological assessments (listed above a-f) are summarised at a high level below. For a detailed account of these matters of disagreement between parties, the reader is invited to refer to the ExA report (paragraph 6.7.10 – 6.7.27), the published RIES and responses to it, statements of common ground between parties, and other detailed examination documents. The Secretary of State is satisfied that these documents clearly set out the opinions of all Interested Parties and all of these views have been taken into consideration in his decision making. Only those disagreements upon methodological approaches that materially affect the Secretary of State's conclusions of effects on site integrity are addressed in this HRA.

a) Baseline data

6.10 NE concluded that the baseline data were adequate for the purposes of the HRA "…*subject to adequate consideration of variability and uncertainty in the data*" [REP7-034]. The RSPB agreed that the baseline data were adequate, but remained concerned that survey coverage had been inadequate for the purposes of displacement analysis [REP8-005].

b) Collision Risk Modelling

6.11 There was unresolved disagreement between the Applicant, NE and the RSPB on what was the most appropriate Band model option to be used. The Applicant deemed that there was enough site-specific data, using boat–based observations, to justify the use of the Extended Band model Option 4 for the most numerous species likely to be at risk of collision (such as kittiwake and gannet) [APP-034]. For all other species, including the auk species (razorbill, guillemot and puffin), the Applicant used the Band model Option 1, which assumes equal mean collision probability for all flights at rotor height. NE and the RSPB advocated the use of the Basic Band model Option 2 which uses generic flight height data. This was largely because of concerns about the accuracy of the Applicant's flight height data: both NE and the RSPB disputed the accuracy of the observations made during the boat-based surveys and the way the data were then manipulated to estimate the proportion of birds at collision height.

6.12 Throughout the Examination there was unresolved disagreement between the Applicant and NE and the RSPB on what was the most appropriate avoidance rate (AR) to be used. The Project examination has been informed by the findings of the Marine Scotland Science (MSS) report (Cook et al, 2014) commissioned to provide a review of the evidence used to determine avoidance rates (ARs) in collision risk modelling for five priority species (kittiwakes, gannets, herring gulls, LBBG and GBBG), and to make appropriate recommendations as to which AR was appropriate for use with different options of the Band model. The SNCBs largely supported the conclusions of the report [see REP1-076 for more details]. The Applicant considers that the application of a 98% AR is suitably precautionary for use in the extended model to determine collision risk mortality for gannet and kittiwake, whereas NE and the RSPB, in line with the recommendations from MSS, do not agree that there are any appropriate ARs to use with the Extended model for these species.

6.13 At the request of the ExA, the Applicant presented a range of collision risk modelling outputs using all versions of the Band (2012) model at a range of avoidance rates in the offshore ornithology SoCG with NE [REP6-014]. Table 5 below summarises the position of the Applicant and NE with regard to Band model options and avoidance rates compared to MSS (Cook et al 2014).

Table 5: Comparison of positions on preferred Collision Risk Model and Avoidance Rate (ExA report: Table 6.3)

Species	MSS (Cook et al 2014)	NE	Applicant
Kittiwake	99.2% AR with Basic Band model No recommended AR for use with Extended Band model	98.9% with Basic Band model. No recommended AR for use with Extended Band model	98% for use with Extended Band model Option 4
Gannet	98.9% with Basic Band model No recommended AR for use with Extended Band model	Agree with MSS	98% for use with Extended Band model Option 4

c) Bird displacement rates

6.14 Displacement arises when there is a significant reduction in the density of birds, compared to the baseline, within the actual wind farm area and the surrounding buffer zone. The displacement methodology employed by the Applicant followed NE/JNCC guidance in presenting displacement matrices for relevant species across the full range of displacement and mortality percentages for the project site, plus a 2km buffer.

6.15 There were areas of disagreement between NE, the RSPB and the Applicant on two displacement issues: seasonal or annual estimates of displacement, and the summing of mortality estimates from both collision risk and displacement analyses. The Applicant's position is that (i) it was not appropriate to sum seasonal estimates of displacement, as this assumes that the populations from which the birds derive are discrete, which is unlikely to be the case; and (ii) displacement and collision risk are not independent, as collision risk analysis includes birds in flight and displacement analysis includes both birds in flight and on the water, and, as such their summing will include double counting [REP3-014]. In contrast, NE and the RSPB support annual estimates of mortality [REP3-033] and the summing of mortality estimates from both collision risk and displacement analyses for gannet [REP3-041] [REP3-033]. NE argues that summing mortality estimates across biologically defined seasons can be used to produce an annual figure to assess the population impact through modelling at the appropriate scale [REP3-033]. The RSPB's view is that mortality resulting from displacement may occur throughout the year so seasonal mortality figures should also be combined to give an annual figure [REP3-041]. With regard to summing displacement and collision related mortalities for gannet, NE agrees that collision risk assesses birds in flight, while displacement is looking at all birds in the area, both in flight and on the water. NE also argues, however, that by aligning displacement rates to avoidance rates double counting can be minimised [REP3-033].

d) Potential Biological Removal (PBR) and Population Viability Analysis (PVA) sustainability assessment

6.16 Once the impacts of the offshore wind farm on the various bird species have been estimated, the next step is to determine what impact that will have on the species population on a recurring annual basis. Two principal methods for this are:

- PBR calculations which provide a means of estimating the number of additional bird mortalities that a given population can sustain. It can be used to identify sustainable harvest rates that would maintain populations at, or above, maximum net productivity level (MNPL) or maximum sustained yield; and
- PVA calculations which use simulation modelling of population processes and population size. They can use density dependent (DD) and density independent (DI) approaches (based on surrogate populations of the same species elsewhere or ecologically similar species).

6.17 The Applicant initially used a PBR approach in its ES [APP-034]. However both NE and RSPB advocated the use of PVA. In response the Applicant produced a comprehensive PVA Report for five populations of seabirds (gannet, kittiwake, guillemot, razorbill and puffin) at the FFC pSPA [REP2A-015]. This report facilitated the adoption of a PVA appraisal for all key HRA ornithological species. However some disagreements still remained. For example, the Applicant's preference is for the DD approach on the grounds that *"Populations subject to density dependence regulation are effectively buffered against potentially negative effects which do not impinge on the limiting resource*" [REP2A-015]. However, NE and the RSPB preferred the DI approach because they do not feel the Applicant's data were sufficiently robust to apply DD in PVA modelling [REP3-033, REP4-054].

e) Apportionment of effects to individual SPA colonies

6.18 NE raised a number of issues regarding the Applicant's assumptions about the apportioning of predicted impacts on various species in the HP2 OWF area, during the breeding and non-breeding seasons, back to individual SPAs, including in particular the FFC pSPA [RR-021]. The Applicant responded with a set of five clarification notes, for five species [REP2A-016 to REP2A-020]. The ExA commented that these clarification notes were useful in setting out details of the Applicant's position and deemed implications for the FFC pSPA, in addition to the position of NE and, as relevant, a clarification of where differences between the Applicant and NE occurred. The issue of apportioning birds to the pSPA during the breeding season was not agreed by the various parties during the Examination.

f) Tiering and relevant projects for in-combination assessment

6.19 The Applicant used a two-tiered approach to the identification of other projects to be considered in-combination with the Project [APP-034 and APP-0171 to APP-0175]:

- Tier 1: Other projects/plans currently under construction and/or those consented but not yet implemented, and/or those submitted but not yet determined and/or those currently operational

that were not operational when baseline data was collected, and/or those that are operational but have an ongoing impact; and

- Tier 2: All projects/plans included in Tier 1, as well as those on relevant plans and programmes that are likely to come forward but have not yet submitted an application for consent. Specifically, this Tier includes all projects where the developer has advised PINS in writing that they intend to submit an application in the future, or where only a scoping report or PEI is available.

Table 6: Projects Identified by the Applicant for in-combination assessment (ExA: Table 6.4)

Tier	Description of Tier	Agreed list of Projects in Tier
1	Built and operational projects	*Belwind- Phase 1 and Demonstration* *Egmoind aan Zee* Greater Gabbard Gunfleet Sands Kentish Flats Lincs London Array Lynn and Inner Dowsing Sheringham Shoal Teesside Thanet *Thornton Bank*
	Projects under construction	Humber Gateway *Northwind* Beatrice *Belwind- Phase 2* Blyth
2	Consented or submitted applications	Aberdeen European Offshore Wind Deployment Centre *Breeveertien* Dogger Creyke Beck A and B Dudgeon East Anglia One Firth of Forth Phase 1 Seagreen Alpha Seagreen Bravo Galloper Hornsea Project One Inch Cape Kentish Flats Extension Moray Firth Project 1 Neart na Gaoithe *Norther* Race Bank Rentel Triton Knoll Westernmost Rough Dogger Teesside Projects A and B

6.20 Whilst NE/JNCC advised a six-tiered approach for such assessments, NE and RSPB indicated that they had no objection to the Applicant's approach. The ExA advised that with the sub-sections within Tier 1, the tiers in the NE approach were broadly covered by the Applicant's approach. NE also noted that it was broadly content with the list of projects and species that have been included by the Applicant; it also noted that the projects are different for different species as you are looking at different population scales [REP3-033]. The Applicant has used the full consented capacity figure

for each of the projects within the in-combination assessment, notwithstanding any confirmation from the relevant developers that less than the consented amount will be built out.

Conclusions on disagreements between parties on different methodological approaches

6.21 Due to the range of expert opinions on each of the matters of disagreement, the ExA advocated the importance of building a sensitivity analysis approach into the assessment of potential ornithological impacts. This involves assessing impacts across a range of Band model options, ARs, displacement rates etc., and examining their relative significance and the implications for the HRA for particular species, for the Project alone, and in-combination with other projects, at relevant European sites (see ExA: 6.7.7). The Secretary of State advocates this approach to presenting assessments.

6.22 The potential for the Project to constitute an adverse effect on site integrity are next considered for each feature in turn, both alone and in-combination with other plans and projects.

Black-legged kittiwake

6.23 A LSE upon the kittiwake interest feature of the FFC pSPA and FHBC SPA was identified because of the potential for the Project, both alone and in-combination with other plans and projects, to increase the risk of collision mortality during the operational phase.

6.24 As discussed above, interested parties did not agree on how to assess kittiwake collision mortality. Issues of disagreement included: choice of Band models, birds at potential collision height (PCH), ARs, PVA approaches, apportionment, and the size of the kittiwake population at the FFC pSPA. The ways in which these methodological disagreements relate specifically to Kittiwake are set out briefly in Table 7.

Table 7: Summary of issues of disagreements between parties on Kittiwake collision mortality at FFC pSPA

Parameter	Summary of disagreements
Flight height	NE and the RSPB highlighted particular concerns about the percentage of kittiwake calculated as being at PCH, with the percentage lying outside the confidence intervals associated with the PCH values in Johnson et al (2014) and being much lower than the PCH used for kittiwake in the assessment of the Dogger Bank Creyke Beck wind farm [REP5-036 and REP6-018]. The Applicant maintained its position that the values used in its assessment fall with the ranges used by other offshore wind projects [REP4-040] and that the use of site-specific flight data is entirely appropriate [REP6-005].
Choice of CR Model and AR	The Applicant advocates the use of Option 4 of the Extended Band model. Although the MSS report [REP1-075] did not recommend an AR for use with the Extended Band Model, a 2013 review by SMart Wind and Forewind [REP1-077] concluded that an AR of 98% was sufficiently precautionary. Both NE and the RSPB support the use of a Basic Band model, and they did not consider that the generic avoidance rate of 98% was appropriate to use with the Extended model. For the Basic model, they support the SNCB's AR figure of 98.9%, rather than the MSS report figure of 99.2%, on the grounds that the MSS report classes kittiwake as a small gull. The 'small gull' data are based on species that use coastal habitats rather than the open ocean that kittiwake mainly use [REP3-033 and REP6-018]. The Applicant's position is that kittiwake is a small gull in terms of flight speed and physical agility and that the difference in terms of habitat use is likely to lead to higher rates of avoidance than that recorded for kittiwake in the MSS report [REP4-040].
Apportioning mortality to sites	The Applicant set out the assumptions made regarding the spatial and numerical distribution of non-breeding (including immature) birds during the breeding season and the foraging ranges of breeding adults from the FFC pSPA [REP2A-018]. This shows agreement between NE and the Applicant on some issues, for example on a kittiwake foraging range, but not on others, for

	example the proportion of adult birds from the FFC pSPA at the Project site during the breeding season. It also shows, in conclusion, higher figures for predicted mortality on the basis of NE assumptions compared with the assumptions used by the Applicant.
How the kittiwake population at Flamborough Head had changed since the 1970s	NE and the RSPB noted that the kittiwake population had decreased from c 85,000 pairs in 1987 to c 45,000 pairs (2008-11 mean used to classify the FFC pSPA), thereby indicating that the population had undergone a significant decline of at least 4% pa [REP6-017]. Drawing on a number of sources, the Applicant disputed the NE analysis [REP4-040], noting a concern that the 1987 population was based on a count of adult kittiwakes, not pairs. The Applicant suggests that, if the disputed data from 1987 are excluded, the data on the breeding colonies at Bempton and Filey less clearly indicate a supposed decline: "it seems likely that the population has remained around 40,000 pairs for much of that time. This is close to the maximum size for colonies of this species, suggesting strong competition for resources and colony size limitation by density-dependence" [REP2A-015].

6.25 Due to the scale of the unresolved disagreements between parties, in order to build a sensitivity analysis approach into the assessment of potential ornithological impacts, the Applicant presented collision risk figures for kittiwake derived from the range of modelling parameters [REP6-014] and these are discussed in the context of alone and in-combination assessment in the next sections.

Kittiwake: Alone assessment

6.26 A LSE upon the kittiwake interest feature of the FFC pSPA was identified because of the potential for the Project alone to increase the risk of collision mortality.

6.27 Table 8 summarises the positions of NE, RSPB and the Applicant on kittiwake collision risk estimates for both the Project as originally submitted, and for the final Project including mitigation proposed by the Applicant.

Table 8: Annual kittiwake collision risk estimates attributable to the FFC pSPA for the Project alone (Source: ExA: Table 6.5)

Project configuration	**Number of kittiwake**	
	Basic Band Model Option 2; 98.9% AR (NE position)	**Extended Band Model Option 4; 98% AR (Applicant's position)**
Original Application: 5MW x 360 turbines; Minimum blade tip height from 26m relative to LAT	104.6	6.2

Final Mitigation: 6MW x 300 turbines; Minimum blade tip height from 34.97m relative to LAT; Maximum rotor diameter 241.03m	48.1 (range 26.1 to 82.8)	0.8 (range 0.4 to 1.4)

6.28 The Applicant advised that, in order to reduce ornithological collision impacts, in particular on the kittiwake population, there would be a reduction in the project's design envelope, specifically:

(i) The removal of the 5MW WTG option (the smallest capacity is now a 6MW WTG) meaning that the worst case number of WTGs would now be 300, rather than 360;

(ii) An increase in the minimum blade tip height from 26m relative to lowest astronomical tide (LAT) to 34.97m relative to LAT; and a

(iii) Reduction in rotor diameter from 250m to 241.03m [AS-013].

6.29 In the ExA's view, the changes are non-material and would not affect the outcome of the Applicant's HRA.

6.30 The Applicant maintained that the positions of NE and the RSPB are over-precautionary in terms of several factors including the version of the Band model, AR, use of the DI model in the PVA, adding of seasons, population trends and apportionment to the pSPA. Agreement was not reached on these points between NE, the RSPB and the Applicant during the Examination.

6.31 The Applicant undertook a PVA assessment which showed that all Project alone estimates represented magnitudes of effect that were less than 1% of the background mortality of the kittiwake population and were therefore not significant [REP2A-015: Table 6]. PVA modelling undertaken by the Applicant indicates that the resulting levels of mortality predicted to arise from the Project alone would not be sufficient for the population to decline below the FFC pSPA citation for this species (REP2A-018).

6.32 Despite the methodological disagreements, following the Applicant's final proposal of mitigation and provision of PVA assessment (REP2A-015), NE was able to agree that, using its preferred approach to analysis (which estimated a total collision mortality of 48.1 birds), it could conclude that there would be no adverse effect on the integrity of the kittiwake feature of the FFC pSPA [REP6-014]. This was based on the view that a reduction in % per annum GR of around 0.116% and a relative reduction in final population size of around 2% (PVA outputs for 50 birds) would not be of sufficient significance in the context of annual survival and baseline mortality rates for kittiwake to cause an adverse effect on integrity, even for a population experiencing declines [NE, 11.12.15: Para 4.14].

6.33 Using its preferred approach to analysis, (which estimated the alone collision mortality to be 52 [REP8-006]), RSPB was unable to reach a conclusion of no adverse effect on the integrity of the FFC pSPA from the project alone.

6.34 The ExA stated that it has taken into account the views of the Applicant, NE and RSPB during the examination, and notes the disagreements which it has given due consideration. It notes the level of

uncertainty in relation to collision risk estimates resulting from many factors, and that it welcomes the provision of estimates across a range of models and approaches. The ExA states that it has 'some concern that some parties are being over-precautionary, particularly in relation to: the appropriate AR to use for the Basic Band model, where the SNCBs do not fully accept the findings of the MSS report; DD versus DI PVA approaches; approaches to apportionment; and some residual questions on the stability or otherwise of trends in the pSPA kittiwake population' (ExA 6.7.48). However, the ExA concludes that 'there is no adverse effect for the kittiwake species on the integrity of the FFC pSPA of (the Project) alone' (ExA 6.7.49).

Conclusions

6.35 The Secretary of State recognises the methodological disagreements between the parties and welcomes the approach of presenting a range of collision risk estimates. He has considered the representations made by the Applicant, NE and the RSPB and the recommendation as made by the ExA. The Secretary of State is satisfied that the potential increased kittiwake collision mortality as a result of the Project alone would not represent an adverse effect upon the integrity of the FFC pSPA. For this conclusion he places particular weight on the advice of NE that a relative reduction in final population size of around 2% would not be of sufficient significance in the context of annual survival and baseline mortality rates for kittiwake to cause an adverse effect on integrity.

Kittiwake: In-combination assessment

6.36 A likely significant effect upon the kittiwake interest feature of the FFC pSPA was identified because of the potential for the Project, in-combination with other plans and projects, to increase the risk of collision mortality.

6.37 The following projects were considered by the Applicant in-combination using each of the project's full consented capacities and taking a tiered approach:

- Blythe Demonstration Project
- Dogger Bank Creyke Beck Projects A and B
- Dogger Bank Teesside Projects A and B
- Dudgeon Offshore Wind Farm
- Humber Gateway
- Hornsea Project One
- Lincs
- Teeside
- Triton Knoll
- Westernmost Rough

Collision

6.38 Both the original annual in-combination estimates of the Applicant and of NE surpassed the 1% threshold of baseline mortality for kittiwake and consequently further modelling was undertaken

using PVA. Table 9 provides a summary of the positions of NE and the Applicant on kittiwake collision risk estimates in-combination with other plans and projects, including changes in those estimates as a result of the two stages of mitigation submitted by the Applicant.

Table 9: Annual kittiwake collision risk estimates attributable to the FFC pSPA, for HP2 in-combination with other plans and projects, for the original and subsequent mitigated project configuration (ExA: Table 6.6)

Project configuration	**Number of kittiwake**	
	Basic Option 2 (NE position)	**Extended Option 4 (Applicant position)**
Original Application: 5MW x 360 turbines; minimum blade tip height from 26m relative to LAT [REP2A-018]	484.9	145.8
Final mitigation: 6MW x 300 turbines; minimum blade tip height from 34.97m relative to LAT; reduction in the maximum rotor diameter from 250m to 241.03m [REP7-021]	314	108

6.39 The Applicant's PVA modelling [REP2A-015] indicated that the additional collision mortality predicted to arise from the Project, in-combination with other projects (at the level predicted by the Applicant, 146 individuals pa, or at the level predicted by NE, 485 pa) would not result in a decline of this population below the pSPA citation of c 45,000 pairs. NE and the RSPB disagreed with this conclusion.

6.40 The Applicant commented on the consistency of NE's advice compared with other recent OWF Examinations, where for example NE advised that an additional mortality of 500 birds would not increase the probability of population decline significantly [REP4-040]. The Secretary of State notes that for Hornsea One, NE advised that a PBR threshold of 512 was appropriate for the same population at the same European site [Hornsea HRA, 27.11.14] and for both Navitus Bay OWF and Dogger Bank Teesside A and B, NE advised that 500 adult kittiwake is the value at which PVA modelling suggests that the Flamborough kittiwake population would still have a >95% probability of continued growth (Smart Wind Kittiwake summary position 26.11.15).

6.41 The RSPB were supportive of NE's position (RSPB DEADLINE 8 SUB 13.12.15) on thresholds and commented on:

- The unsuitability of PBR for assessment;
- The focus on density independent PVA models for assessment;
- The use of counterfactual metrics as the correct output for PVA; and
- The fact that all thresholds are essentially arbitrary.

6.42 The ExA sought clarification from NE on (i) the reasons for the differences in its assessment of project impacts, in-combination, on kittiwakes, between Hornsea One and the Project and (ii) a level of kittiwake mortality in-combination which it could accept would not have an adverse effect on the integrity of the FFC pSPA and the FHBC SPA. NE responded [REP8-003] that 'the use of specific or precise thresholds carries a significant risk of creating a 'false precision' to assessing impacts' and that 'it is difficult to identify a precise evidence-based threshold or

specific level beyond which there would be an adverse effect on integrity'. NE stated that 'the lack of a threshold, or specified level at which an integrity effect arises, does not prevent the reaching of integrity judgements' and refers to its most recent integrity judgements following the mitigation proposed by the Applicant.

6.43 NE did not agree with a number of the methodological approaches taken by the Applicant, including the way the Applicant used tracking data to assess connectivity between the SPA and the Project, and the way breeding season collisions have been apportioned [REP5-036]. Although NE do not accept much of the Applicant's analysis, using their preferred approach to assessing impacts on this species, and following the mitigation proposed by the Applicant (outlined above), NE confirmed in REP7-034 "… it was able to reach a conclusion of no adverse effect on integrity, alone and in-combination, on the kittiwake feature of the FHBCSPA and FFC pSPA, subject to the mitigation submitted by the Applicant".

6.44 The RSPB did not agree with the Applicant's conclusions for the project alone and in-combination (REP5-037) and was unable to reach a conclusion of no adverse effect on integrity. The RSPB estimate of annual collisions attributed to the FFC pSPA for HP2 in-combination, for the second stage mitigation configuration was 356 [REP8-004], (42 more than NE's position and 248 more than the Applicant's position). RSPB maintained its position on the vulnerability of the FFC pSPA and FHBC SPA kittiwake population, noting that the latest update (December 2015) to the Birds of Conservation Concern[16], shows that the breeding population of kittiwake is now on the Red List of conservation concern, being previously amber.

6.45 Other areas of disagreement between RSPB and other parties included; different approaches to the use of Counterfactual of Population in the PVA approach, with RSPB preference for the Counterfactual of Population Size (CPS), which is the percentage difference between median population sizes with and without the development, after 25 years; compared with the NE preference for the Counterfactual of Population Growth Rate (CPGR), which is the change in median population growth rate. RSPB was also concerned about the adequacy of data provided by the Applicant on the ornithological implications of the two mitigation stages of the OWF configuration (ExA 6.7.47).

6.46 The ExA stated that it has taken into account the views of the Applicant, NE and RSPB during the examination. It noted the level of uncertainty in relation to collision risk estimates resulting from many factors, and that it welcomes the provision of estimates across a range of models and approaches. It stated that it has 'some concern that some parties are being over-precautionary, particularly in relation to: the appropriate AR to use for the Basic Band model, where the SNCBs do not fully accept the findings of the MSS report; DD versus DI PVA approaches; approaches to apportionment; inclusion of the full build-out of all projects in the in-combination assessment, when several are highly unlikely to be fully built-out; and some residual questions on the stability or otherwise of trends in the pSPA kittiwake population' (ExA 6.7.48). The ExA concluded that 'there is no adverse effect for the kittiwake species on the

[16] https://www.bto.org/science/monitoring/psob

integrity of the FFC pSPA of (the Project) alone, and in-combination with other plans and projects' (ExA 6.7.49).

Conclusions

6.47 The Secretary of State recognises the methodological disagreements between the parties and welcomes the approach of presenting a range of collision risk estimates. He has considered the representations made by the Applicant, NE and the RSPB and the recommendation as made by the ExA. The Secretary of State is satisfied that, taking into account the mitigation proposed by the Applicant, the potential increased kittiwake collision mortality as a result of the Project in-combination with other plans and projects, would not represent an adverse effect upon the integrity of the FFC pSPA. For this conclusion he places particular weight on the advice of NE.

Northern Gannet

6.48 A likely significant effect upon the gannet interest feature of the FFC pSPA was identified because of the potential for the Project, both alone and in-combination with other plans and projects, to lead to collision mortality and displacement.

6.49 The FFC pSPA is the only gannet breeding colony in England, supporting c12,500 occupied nests concentrated in an approximately 5km stretch of cliff [HRA Report Part 2, APP-0172]. This pSPA population accounts for approximately 3.3% of the North Atlantic biogeographic population. The Bempton Cliffs colony has been increasing since the 1980s, with a growth rate of 10.5% pa between 1986 and 2012, and growth rate of 12.8% pa between 2004 and 2012. However the RSPB takes the view that the growth of the UK population is likely to be man-made because of the availability of discards from fishing vessels. It argues that as discards are likely to disappear in future this could lead to reduced population growth [REP8-004].

6.50 The key areas of disagreement in methodological approach to modelling the impact of the Project upon gannets between the Applicant, NE and RSPB are outlined in Table 10.

Table 10: Summary of issues of disagreements between parties on gannet collision and displacement mortality at FFC pSPA

Parameter	Summary of disagreements
Site specific flight height data	NE and the RSPB disputed the use of site-specific flight height data, while the Applicant maintained their position that this was preferable to the use of generic flight height data. Parties also interpret differently the significance and findings of Cleasby et al. (2015) (REP7-022] on PCH. The Applicant [REP5-009] highlighted the very small sample of birds, issues of extrapolating results across seasons, and varying bird densities between near shore and much further offshore locations. NE had similar views [REP5-036]. The RSPB considered that the research findings demonstrated that collision estimates for gannet, based on flight height derived from boat surveys, are likely to seriously underestimate collision risk [REP5-037]. The ExA's Report noted that the Cleasby et al. study indicates a flight height for gannet while foraging of 27m which is now substantially less than the minimum blade tip height relative to LAT of 34.97m agreed in mitigation for the Project (ExA 6.7.55).
Choice of CR Model and AR	The Applicant advocated the use of Option 4 of the Extended Band model with a 98% AR. Both NE and the RSPB supported the use of a Basic Band model. NE advocated the use of a 98.9% AR with the Basic Band Model but RSPB advocated the use of a 98% AR with the Basic Band Model [REP1-047].
Choice of PVA metric	RSPB did not agree with NE's choice of PVA metric. The RSPB also interpreted the Applicant's PVA as indicating a high net immigration from the Bass Rock gannetry which may be affected by increased mortality caused by

	other wind farms [REP8-004].
Summing of seasonal mortality estimates	RSPB and the Applicant disagreed on the issue of the summing of seasonal mortality rates to produce an overall annual mortality. RSPB advised that given the lack of empirical data to support different displacement and mortality rates at different times of the year, the same range of displacement and mortality rates should be applied across all seasons in the assessment and should be summed to give an annual figure.
Addition of collision and displacement values	NE and the RSPB advised that displacement and collision related mortality should be added together for gannet to give an annual figure for mortality. The Applicant has maintained the position that this would be problematic and potentially involve double counting.

6.51 Due to these disagreements, estimates of potential collision risk and displacement impacts were provided across a range of Band models and parameters [REP1-061] in order to build a sensitivity analysis approach into the assessment of potential ornithological impacts. These are discussed in the context of alone and in-combination assessment in the next sections.

Gannet: Alone assessment

6.52 A likely significant effect upon the gannet interest feature of the FFC pSPA was identified because of the potential for the Project alone to lead to collision mortality and displacement.

6.53 Table 11 summarises the positions of NE and the Applicant on gannet collision and displacement estimates for the Project (as originally applied for, i.e. the original project configuration). These positions were based on the original project parameters, prior to mitigation to reduce the scale of the project as outlined in paragraphs 6.28-6.29 and so the actual impact is likely to be less.

Table 11: Annual gannet collision and displacement risk estimates attributable to the FFC pSPA for the Project alone (Source: ExA Table 6.7 and REP3-029)

	Basic Band Model Option 2; 98.9?% AR (NE position)	**Extended Band Model Option 4; 98% AR (Applicant's position)**
Original Application: 5MW x 360 turbines; Minimum blade tip height from 26m relative to LAT	37 total • 17 (varying between 6-37) from collision • Up to 20 from displacement	15 total

Collision

6.54 The Applicant concluded that there would be no adverse effect on the integrity of the gannet feature of the FFC pSPA from collision-related mortality.

6.55 NE and the RSPB advised that a PVA should be used to assess population-level effects. The Applicant provided a PVA for both density-dependent and density-independent models (REP2A-015) and an updated note on apportioning effects for gannet (REP2A-016).

6.56 Following provision of the updated note on apportioning effects by the Applicant and updated PVA modelling, while NE maintained their position on the choice of flight height data, Band model and AR, they were able to undertake their own analysis of the figures and reach a conclusion of no adverse effect on integrity on the gannet feature of the FFC pSPA from the project alone.

6.57 NE's conclusions drew on a PVA DI approach which considered that predicted mortalities for the Project alone would not exceed a level whereby the growth rate of the population would be reduced by up to 0.45% pa, and the final population would be 10% lower than an un-impacted population size at 25 years. DI PVA model predicts that the population will still continue to grow at a 1.79% pa over the next 25 years (REP3-029).

6.58 Due to the issues of disagreement outlined in Table 10, RSPB was unable to reach a conclusion of no adverse effect on integrity on the gannet feature of the FFC pSPA from the project alone.

Displacement

6.59 The Applicant concluded that there would be no adverse effect on the integrity of the gannet feature of the FFC pSPA from displacement-related mortality.

6.60 NE and the Applicant maintained different positions on displacement levels. NE's position is that displacement and collision related mortality should be added together to give an annual figure for mortality. The Applicant's view is that addition of displacement to collision mortality figures leads to double counting.

6.61 However NE concluded that, based on its own figures shown in Table 11, there would be no adverse effect on the integrity from displacement effects on gannet from the project alone.

6.62 The RSPB disagrees with both the Applicant and NE's position on displacement mortality and does not agree with a conclusion of no adverse effect on integrity for gannet.

6.63 The ExA stated that it has taken into account the arguments advocated, and the data provided, by the Applicant, NE and the RSPB. It noted that although there are some differences in approach by the Applicant and NE, the predicted differences in impacts on the gannet species for the project alone are not considered to be significant (see table 11). The ExA agreed with the Applicant and NE that, on the basis of its Examination and of objective scientific evidence, there is no adverse impact for the gannet species on the integrity of the FFC pSPA of the project alone [ExA: 6.7.60].

Conclusions

6.64 The Secretary of State recognises the methodological disagreements between the parties and welcomes the approach of presenting a range of collision risk estimates. He has considered the

representations made by the Applicant, NE and the RSPB and the recommendation as made by the ExA. The Secretary of State agrees with the views of the ExA, NE and the Applicant and is satisfied that the potential increased gannet collision mortality and displacement as a result of the Project alone would not represent an adverse effect upon the integrity of the FFC pSPA. For this conclusion he places particular weight on the advice of NE that predicted mortalities for the Project alone would not exceed a level whereby the growth rate of the population (currently at 12.8% pa) would be reduced by more than 0.45% pa.

Gannet: In-combination assessment

6.65 A LSE upon the gannet interest feature of the FFC pSPA was identified because of the potential for the Project, in-combination with other plans and projects, to lead to collision mortality and displacement.

6.66 The following projects were considered by the Applicant in-combination using the full consented capacity figure for each of the projects and taking a tiered approach:

6.67 Displacement Effects:

- Dogger Bank Creyke Beck A and B offshore wind farm
- Dogger Bank Teesside A and B offshore wind farm
- Hornsea offshore wind farm Project One

6.68 Collision Mortality

- Aberdeen European Offshore Wind Deployment Centre
- Beatrice Demonstration Project
- Blyth Demonstration Project
- Dogger Bank Creyke Beck A and B offshore wind farm
- Dogger Bank Teesside A and B offshore wind farm
- Dudgeon offshore wind farm
- East Anglia ONE offshore wind farm
- Galloper offshore wind farm
- Greater Gabbard offshore wind farm
- Hornsea offshore wind farm project one
- Humber Gateway offshore wind farm
- Inch Cape offshore wind farm
- Kentish Flats Extension offshore wind farm
- Lincs offshore wind farm
- London Array offshore wind farm
- Moray Firth project one offshore wind farm
- Neart na Gaoithe offshore wind farm
- Race Bank offshore wind farm
- Seagreen Alpha offshore wind farm
- Seagreen Bravo offshore wind farm

- Sheringham Shoal offshore wind farm
- Teesside offshore wind farm
- Thanet offshore wind farm
- Triton Knoll offshore wind farm
- Westernmost Rough offshore wind farm

6.69 NE was content with the list of projects included by the Applicant for in-combination assessment [REP3-033]. However, RSPB did not agree with the projects identified, and considered that East Anglia 3 and Beatrice offshore wind farms should have been included [REP8-004). The Secretary of State is content with the advice of NE that the correct list of projects was identified by the Applicant for the in-combination assessment.

6.70 The Secretary of State has noted the result of a recent legal decision on a number of Scottish windfarms and the appeal by the Scottish Government on the decision. The Secretary of State considers it appropriate to consider the worst case in-combination assessment and so has retained these Scottish projects in the assessment.

6.71 Table 12 summarises the positions of NE and the Applicant on gannet collision and displacement estimates for the Project (as originally applied for), in-combination with other plans and projects.

Table 12: Annual gannet collision risk estimates attributable to the FFC pSPA for the Project in-combination with other plans and projects

	Basic Band Model Option 2; 98.9?% AR (NE position)	**Extended Band Model Option 4; 98% AR (Applicant's position)**
Original Application: 5MW x 360 turbines; Minimum blade tip height from 26m relative to LAT	190	215

6.72 NE calculated the in-combination impact upon gannet to be 190 adults/pa, with no in-combination displacement element to the assessment (see Table 12).

6.73 The Applicant's higher levels of collision estimated of 215 adults/pa through the Extended Model is mostly due to the risk reported for the Dogger Bank projects (Creyke Beck A and B/Teesside A and B).

6.74 NE's conclusions using the DI PVA approach are that with a mortality of 190 birds, the population growth rate is predicted to fall by 0.91% pa and the population size would be 19% lower at 25 years than an un-impacted population size. The PVA model predicts growth of 1.79% per annum and a reduction in growth rate of close to 1% would be considered significant against this. However the growth rate predicted by the PVA model is not a good fit to the observed trend at the colony which is growing at 12.8% per annum. One explanation for this discrepancy is that the higher growth rates observed are being driven by immigration from other colonies. If the colony were to continue to grow at 12.8% per annum, a 0.91% reduction in population growth rate would not be counter to a conservation objective to maintain the

population. While the colony is not predicted to maintain this growth rate indefinitely, productivity rates at the colony remain high. On the basis that the colony is predicted to grow at a rate considerably higher than the 1.79% per annum predicted by the PVA model, NE concluded no adverse effects on site integrity for an additional mortality of 190 adults (REP3-029).

6.75 The RSPB estimate of gannet collisions attributed to the FFC pSPA for HP2 in-combination was 252 (REP8-004). The RSPB did not agree with the projects identified by the Applicant for their in-combination assessment, stating that East Anglia 3 and Beatrice offshore wind farms should have been included (REP8-005). In view of this concern, in addition to the others discussed above, the RSPB maintained its position that adverse effects on integrity in-combination with other plans or projects cannot be excluded (REP8-004).

6.76 The ExA stated that it has taken into account the arguments advocated, and the data provided, by the Applicant, NE and the RSPB. It also noted the current high growth rates of the gannet colony, alongside the RSPB's caution that there may be temporary circumstances for such growth. In conclusion, the ExA agreed with the Applicant and NE that, on the basis of its Examination and of objective scientific evidence, there is no adverse impact for the gannet species on the integrity of the FFC pSPA of the project in-combination with other plans and projects.

Conclusions

6.77 The Secretary of State recognises the methodological disagreements between the parties and welcomes the approach of presenting a range of mortality estimates. He has considered the representations made by the Applicant, NE and the RSPB and the recommendation as made by the ExA. The Secretary of State is satisfied that the potential increased gannet collision mortality and displacement as a result of the Project alone, and in-combination with other plans and projects, would not represent an adverse effect upon the integrity of the FFC pSPA. For this conclusion he places particular weight on the advice of NE that predicted mortalities for the Project in-combination would not exceed a level whereby the growth rate of the population (currently at 12.8% pa) would be reduced by more than 0.91% pa.

Auk Species (common guillemot, razorbill and puffin)

6.78 A LSE upon the auk species interest features of the FFC pSPA (guillemot, razorbill and puffin) was identified because of the potential for the Project, both alone and in-combination with other plans and projects, to lead to displacement of these species during the operational phase.

6.79 The latest counts of auk species at the FFC pSPA are (NE: 2008-2011):

- guillemot 83,214
- razorbill 21,140
- puffin 1,960

6.80 There was some level of agreement between NE and the Applicant on the methodological approach to modelling the impact of the Project upon auk species, for example on a number of apportioning issues such as foraging ranges and seasonal definitions. However a number of disagreements remained between the Applicant, NE and RSPB. These are outlined in Table 13.

Table 13: Summary of issues of disagreements between parties on displacement of auk species at FFC pSPA

Parameter	Summary of disagreements
Proportion of breeding adult birds derived from Project specific data	The Applicant advocated a figure of 6% for puffin. NE advocated a figure of 38% for puffin
Seasonal displacement mortality and preferred mortality rates.	NE advocated a range between 30-70% displacement (10-70% for puffin) and 1-10% mortality for breeding birds. The Applicant's preference was for displacement/mortality rates of 30/10% for breeding guillemot, and 40/10% for breeding razorbill and puffin. The RSPB did not agree with NE's position on displacement levels and did not feel the Applicant had provided sufficient justification for the mortality levels it had used.

Auk Species: Alone assessment

6.81 Table 14 summarises the positions of NE and the Applicant on the auk species displacement mortality estimates attributable to the FFC pSPA for the Project alone as originally applied for (i.e. the original project configuration). These positions were based on the original project parameters, prior to mitigation to reduce the scale of the project as outlined in paragraphs 6.28-6.29, and so the actual impact is likely to be less

Table 14: **Annual auk species displacement mortality estimates attributable to the FFC pSPA for the Project alone (Source: ExA Table 6.9 and REP3-029)**

Auk species	NE position	Applicant's position
Guillemot	12-291	29
Razorbill	4-100	39
Puffin	0-13	1

6.82 The Applicant, NE and RSPB used different modelling approaches to produce the different annual figures in Table 14 above. NE uses a range based on its preferred displacement/mortality rates; the Applicant in contrast uses a mean figure. The Applicant preferred a DD PVA approach, compared with the DI approach preferred by NE and the RSPB; the DD approach predicts smaller declines in species growth rates.

6.83 The Applicant set out its initial key data on the auk populations in the HRA report [APP-0172]. This was reinforced with clarification notes on apportioning [REP2A-017, REP2A-019 and REP2A-020].

6.84 The Applicant concluded no adverse effects on the integrity of the FFC pSPA for guillemot, razorbill and puffin from the impacts of the Project alone.

6.85 Despite the differing methodological approaches to calculating displacement mortality from the Applicant, NE advised in the first ISH on 16 September 2015 and in submissions [REP3-014, REP3-033, REP3-036, REP3-037 and REP3-038] that it could also conclude no adverse effects on the integrity of the FFC pSPA for guillemot, razorbill and puffin from the impacts of the Project alone. The reasons for this are set out in detail below.

- **Guillemot:** NE noted that the DI PVA model predicted a population growth rate of 4.42% pa over the next 25 years. The FFC pSPA colony increased by 2.8% pa between 1987 and 2008. When the conservation objectives are set for the FFC SPA there is likely to be a 'maintain' objective for the guillemot feature. Based on the current population trend for the colony and on the basis of predicted displacement mortality for the project alone resulting in a decline in growth rate of no more than 0.3%, NE considered that there would be no adverse impact on site integrity [REP3-036].

- **Razorbill:** NE noted that the DI PVA model predicted a population growth rate of 6.89% pa over the next 25 years. The FFC pSPA colony increased by 2.8% pa between 1987 and 2008. When the conservation objectives are set for the FFC SPA there is likely to be a 'maintain' objective for the razorbill feature. Based on the current population trend for the colony and on the basis of predicted displacement mortality for the project alone resulting in a decline in growth rate of no more than 0.5%, NE considered that there would be no adverse impact on site integrity [REP3-037].

- **Puffin:** NE noted that the DI PVA model predicted a population decline of 0.77% pa over the next 25 years, although there is some methodological difficulty in surveying puffin population trends. It is not expected that the mortality from displacement will exceed a level where the population growth rate would decline by more than 0.25% pa. As such, NE concluded that

there is no indication that the predicted potential decline in the growth rate of the puffin population would mean that either the abundance or richness of the breeding seabird assemblage would be reduced to the extent that it would cause an adverse effect on site integrity [REP3-038].

6.86 In contrast, the RSPB maintained its objection to the Project for these species. The RSPB disagreed with NE on the best model output for the PVA DD model, preferring the CPS approach rather than the CPGR used by NE. The RSPB also raised concerns about the conservation status of auk species, noting that the International Union for Conservation and Nature (IUCN Red List, updated on 29 October 2015, has changed the criteria for puffin to 'vulnerable' and for razorbill to 'near threatened' and that puffin has been added to the UK Birds of Conservation Concern's Red List. The RSPB also noted that the UK has a significant proportion of the biogeographical and global population of both guillemot and razorbill, and as such has a responsibility to protect this population

- **Puffin:** The RSPB noted that it is highly probable that the pSPA puffin population has decreased since 2000. RSPB state that in the context of the global and national population decline, such large reductions in population size as from the Project alone (14.7%) are unacceptable and as such, is unable to rule out the possibility of an adverse effect on this SPA species (RSPB DEADLINE 8 SUBMISSION 13.12.15).
- **Guillemot and Razorbill:** The RSPB noted that the Applicant's PVA modelling predicts potential decreases in the pSPA guillemot population size of 8.1%, and potential decreases in the pSPA razorbill population size of 10.9%, from the Project alone. RSPB considers these to be considerable and so states that it is unable to rule out the possibility of an adverse effect on these SPA species (RSPB DEADLINE 8 SUBMISSION 13.12.15).

6.87 The ExA stated that, having taken a balanced view of the sensitivity of the mortality displacement impacts to the methodology used and to the levels of precaution built into the process, it agrees that, on the basis of its examination and of objective scientific evidence, there are no adverse impacts for the various auk species on the integrity of the FFC pSPA from the project alone (ExA Report: 6.7.72)

Conclusions

6.88 The Secretary of State recognises the methodological disagreements between the parties. He has considered the representations made by the Applicant, NE and the RSPB and the recommendation as made by the ExA. The Secretary of State agrees with the recommendations of the ExA, NE and the Applicant and is satisfied that the potential increased auk species displacement mortality as a result of the Project alone would not represent an adverse effect upon the integrity of the FFC pSPA. For this conclusion he places particular weight on the advice of NE that predicted mortalities for the Project alone would not exceed a level whereby the growth rate of the populations would be reduced by more than 0.3% p.a. for guillemot, 0.5% p.a. for razorbill, and 0.25% p.a. for puffin.

Auk Species: In-combination assessment

6.89 Table 15 summarises the positions of NE and the Applicant on the auk species displacement mortality estimates attributable to the FFC pSPA for the Project as originally applied for (i.e. the original project configuration), in-combination with other plans and projects. These positions were based on the original project parameters, prior to mitigation to reduce the scale of the project as outlined in paragraphs 6.28-6.29 and so the actual impact is likely to be less.

Table 15: Annual auk species displacement mortality estimates attributable to the FFC pSPA for the Project in-combination (Source: ExA Table 6.10 and REP3-029)

Auk species	NE position	Applicant's position
Guillemot	61-1,416	298
Razorbill	16-364	59
Puffin	1-54	9

6.90 The Applicant concluded no adverse effects on the integrity of the FFC pSPA for guillemot, razorbill and puffin from the impacts of the Project alone.

6.91 Despite the differing methodological approaches to calculating displacement mortality from the Applicant, NE advised in the first ISH on 16 September 2015 and in submissions [REP3-014, REP3-033, REP3-036, REP3-037 and REP3-038] that it could also conclude no adverse effects on the integrity of the FFC pSPA for guillemot, razorbill and puffin from the impacts of the Project in-combination with other plans and projects. The reasons for this are set out in detail below.

- **Guillemot:** NE noted that, on the basis that the projects that have been scoped into the assessment lie in areas of the North Sea that represent low to medium levels of guillemot density, it is not expected that mortality rates will be at the top end of the range considered and will not exceed a level where the population growth rate would decline by more than 0.4% pa. Based on the current population trend for the colony (noted above) and on the basis of predicted decline in growth rate of no more than 0.4% pa, NE considered that there would be no adverse effects on the integrity of the FFC pSPA for guillemot from the impacts of the Project in-combination with other plans and projects [REP3-036].
- **Razorbill:** NE noted that on the basis that the Project does not lie in an area of the North Sea that supports high densities of razorbill during the breeding or non-breeding season, mortality rates at the top end of the considered range are not expected. NE stated that, even accounting for variability in the baseline population estimates NE does not expect the mortality from displacement to exceed a level where the population growth rate would decline by more than 0.5% pa. Based on the current population trend noted above, and on the basis of the predicted decline in the growth rate of 0.5% pa, NE considers that there would be no adverse effects on the integrity of the FFC pSPA for razorbill from the impacts of the Project in-combination with other plans and projects [REP3-037].

- **Puffin:** NE noted that puffin is a non-listed component of the breeding seabird assemblage of the FFC pSPA. NE did not consider that a predicted potential decline in colony growth rate of 0.25% per annum would significantly alter the richness or size of the seabird assemblage feature of the FFC pSPA and puffin would still be predicted to be a viable component of the assemblage. As a result, NE considered that there would be no adverse effects on the integrity of puffin as a component of the seabird assemblage feature of the FFC pSPA from the impacts of the Project in-combination with other plans and projects. [REP3-038]

6.92 As with the alone assessment, in contrast, the RSPB maintained its objection to the Project for these species for the reasons outlined in paragraph 6.86:

- **Guillemot and Razorbill:** The RSPB noted that the Applicant's PVA modelling predicts potential decreases in population size that are considerable. Predictions are for decreases in guillemot population size of 33.8% for the project in-combination and for decreases in razorbill population size of 34.2% for the project in-combination. As such, the RSPB is unable to rule out the possibility of an adverse effect on these SPA species through the Project in-combination with other projects (RSPB DEADLINE 8 SUBMISSION 13.12.15).
- **Puffin:** RSPB noted that the Applicant's PVA modelling predicts a decrease in puffin population size of 48.2% from the Project in-combination. It states that in the context of the global and national population decline, such large reductions in population size are unacceptable and as such, the RSPB is unable to rule out the possibility of an adverse effect on this SPA species (RSPB DEADLINE 8 SUBMISSION 13.12.15).

6.93 The ExA stated that it had taken into account the arguments advocated, and the data provided, by the Applicant, NE and the RSPB. It again noted the Applicant's position that the other parties are being over-precautionary, for example, on the use of the PVA DD approach, and on the range of displacement/mortality rates. Having taken a balanced view of the sensitivity of the mortality displacement impacts to the methodology used and to the levels of precaution built into the process, the ExA agrees that, on the basis of its examination and of objective scientific evidence, there are no adverse impacts for the various auk species on the integrity of the FFC pSPA of the project alone, and in-combination (ExA Report 6.7.72).

Conclusions

6.94 The Secretary of State recognises the methodological disagreements between the parties. He has considered the representations made by the Applicant, NE and the RSPB and the recommendation as made by the ExA. The Secretary of State agrees with the recommendations of the ExA, NE and the Applicant and is satisfied that the potential increased auk species displacement mortality as a result of the Project in-combination would not represent an adverse effect upon the integrity of the FFC pSPA. For this conclusion he places particular weight on the advice of NE that predicted mortalities for the Project in-combination would not exceed a level

whereby the growth rate of the populations would be reduced by more than 0.4% p.a. for guillemot, 0.5% p.a. for razorbill, and 0.25% p.a. for puffin.

Fulmar

6.95 A LSE upon the Fulmar interest feature of the FFC pSPA was identified because of the potential for the Project, both alone and in-combination with other plans and projects, to lead to displacement of fulmar during the operational phase

6.96 The fulmar population of the FFC pSPA is estimated as being 2,894 (2008-11 count); it is designated as part of the breeding bird assemblage of the FFC pSPA.

6.97 Table 16 outlines the Applicant's assessment of displacement mortality from the Project alone and in-combination with other plans and projects, for the original project configuration.

6.98 The ExA states that no comments on the effects on fulmar were made by any Interested Party during the examination.

Table 16: Applicant's displacement mortality estimates attributable to the FFC pSPA for HP2 alone and in-combination (ExA: Table 6.11)

Assemblage species	Project alone (breeding and non-breeding seasons)	Project in-combination (breeding and non-breeding seasons)
Fulmar	8	17

Fulmar: Alone assessment

6.99 Table 16 summarises the Applicant's assessment of the effects of the Project alone on the Fulmar feature of the FFC pSPA.

6.100 The Applicant's original displacement analysis predicted a mortality of 8 fulmar during the breeding season [APP-0171], based on a displacement rate of 30% and mortality rate of 2%. This represents 0.004% of the pSPA assemblage feature. For the other seasons the predicted mortality is 0. In the Applicant's view the small number of mortalities predicted as a result of displacement and the precautionary nature of the assessment during the breeding season means it is unlikely there would be an adverse effect on the fulmar component of the FFC pSPA assemblage feature from the Project alone.

6.101 The Secretary of State wrote to Interested Parties on 26 May 2016 regarding the Applicant and NE's assessment of displacement of fulmar at three sites, including the FFC pSPA[17]. In this the Secretary of State sought clarification on figures from the Applicant's HRA Report and requested the Applicant revisit a number of specified areas of the report in order to provide the necessary clarity required for him to fully assess the implications of the Project. The Secretary of State also requested that NE provide clarity on its conclusions, as referenced in the Applicant's HRA report. The Applicant[18], NE[19] and RSPB[20] provided responses on 27 June 2016.

[17] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-001315-DECC%20consultation%20letter%20Hornsea%20Offshore%20Windfarm%20(Zone%204)%20-Project.pdf
[18] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002009-Hornsea%20Project%202-%20Response%20to%20Topic%202%20-%20Fulmar%20Displacement%20Mortality.pdf

6.102 The Applicant's response of 27 June 2016, revised upwards the annual fulmar displacement mortality for FFC pSPA, based on the 2012 population estimates, to 13 birds, which represents 0.45% of the fulmar pSPA population and 0.006% of the total assemblage of which fulmar is a listed component. The Applicant concluded that on this basis, the conclusions arrived at in their original HRA Report remain valid, that there is no potential for adverse effect on integrity.

6.103 NE's response of 27 June 2016 stated that NE considered that potential displacement impacts on fulmar from the Project alone and in-combination with other plans and projects are unlikely to be significant, and would therefore not adversely affect the integrity of the breeding bird assemblage at FFC pSPA, of which fulmar is a named component. Fulmar has one of the largest foraging ranges of any seabird regularly found in UK waters (mean max foraging range 400km (Thaxter et al. 2012)). In addition, fulmar have been assessed as having low sensitivity to disturbance coupled with low habitat specialisation (i.e. they are generalists), so that displacement from Project areas and associated mortality is predicted to be very low (Furness et al 2013, Bradbury et al 2014).

6.104 RSPB's response of 27 June 2016 stated that the 2015 FFC pSPA population estimates should be used. RSPB also suggested that the Applicant should present a range of possible displacement and mortality figures.

6.105 The Secretary of State wrote again to Interested Parties on 12 July 2016[21] requesting any observations on the Applicant's submission of 27 June 2016, in particular on the adequacy of the revised figures.

6.106 The RSPB responded on 19 July 2016[22], suggesting again that the Applicant should use the 2015 population estimates. However, the Applicant responded to say that there is currently no 2015 population count currently available[23].

6.107 NE also responded on 19 July 2016[24] to say that it would not be able to provide detailed comments regarding the revised figures due to the tight timescale of consultation. Nevertheless, NE considered that potential displacement impacts on fulmar from the Project alone are unlikely to be significant, and would therefore not adversely affect the integrity of the breeding bird assemblage at FFC pSPA, of which fulmar is a named component.

Conclusions

6.108 The Secretary of State has considered the representations made by the Applicant, the responses to his consultation from the Applicant, NE and the RSPB and the overall

[19] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002001-186857%20-%20%20NE%20Response%20to%20Fulmar%20displacement.pdf
[20] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002000-RSPB%20Response%20to%20Request%20for%20Comments%20on%20the%20Application%20for%20the%20Proposed%20Hornsea%202%20Offshore%20Wind%20Farm.pdf
[21] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002054-12%20July%20%20DECC%20consultation%20letter%20HORNSEA%20Project%202.pdf
[22] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002061-RsPB.pdf
[23] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002063-NE%20Response.pdf
[24] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002063-NE%20Response.pdf

recommendation as made by the ExA for the FFC pSPA. The Secretary of State agrees with the recommendations of the ExA, NE and the Applicant and is satisfied that the potential increased fulmar displacement mortality as a result of the Project alone would not represent an adverse effect upon the integrity of the FFC pSPA. For this conclusion he places particular weight on the advice of NE that fulmar have an extensive foraging range and low sensitivity to displacement as well as the Applicant's modelling which demonstrates that only 0.45% of the fulmar pSPA population would be displaced.

Fulmar: In-combination assessment

6.109 Table 16 summarises the Applicant's assessment of the effects of the Project in-combination with other plans and projects on the Fulmar feature of the FFC pSPA. The other Projects considered in the in-combination were Inch Cape and Hornsea Project 1.

6.110 In the Applicant's view, the calculated precautionary breeding season predicted cumulative mortality of 15 birds (0.07% of the assemblage feature numbers) means that any increase in baseline mortality is likely to be sustainable. Outside of the breeding season, a mortality of 2 birds represents less than 0.02% of the assemblage feature of the pSPA and therefore no adverse effect is predicted [APP-0171]. No comments on fulmar were made by any interested party.

6.111 The Applicant's response of 27 June 2016 to the Secretary of States consultation of the 26 May 2016, revised upwards the annual fulmar displacement mortality for FFC pSPA, based on the 2012 population estimates, to 20 birds using the 2012 population estimates. This represents 0.69% of the fulmar population at the pSPA. The Applicant concludes that on this basis, the conclusions arrived at in their original HRA Report remain valid, that there is no potential for adverse effect on site integrity due to displacement mortality from the project, in-combination with other projects on the fulmar component of the FFC pSPA assemblage feature.

6.112 NE's response of 27 June 2016 stated that it considered that potential displacement impacts on fulmar from the Project in-combination with other plans and projects are unlikely to be significant, and would therefore not adversely affect the integrity of the breeding bird assemblage at FFC pSPA, of which fulmar is a named component. This is for the reasons listed in their comments on the alone assessment above, at paragraph 6.103.

6.113 The RSPB response of 27 June 2016 stated that the 2015 FFC pSPA population estimates should be used before accepting that there are no serious concerns for fulmar. RSPB also suggest that the Applicant presents a range of possible displacement and mortality figures.

6.114 The Secretary of State wrote again to Interested Parties on 12 July 2016[25] requesting any observations on the Applicant's submission of 27 June 2016, in particular on the adequacy of the revised figures.

[25] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002054-12%20July%20%20DECC%20consultation%20letter%20HORNSEA%20Project%202.pdf

6.115 The RSPB responded on 19 July 2016[26], suggesting again that the Applicant should use the 2015 population estimates. However, the Applicant responded to say that there is currently no 2015 population count currently available[27].

6.116 NE also responded on 19 July 2016[28] to say that it would not be able to provide detailed comments regarding the revised figures due to the tight timescale of consultation. Nevertheless, NE considered that potential displacement impacts on fulmar from the Project in-combination with other plans or projects are unlikely to be significant, and would therefore not adversely affect the integrity of the breeding bird assemblage at FFC pSPA, of which fulmar is a named component.

Conclusions

6.117 The Secretary of State has considered the representations made by the Applicant, the responses to his consultation from the Applicant, NE and the RSPB and the overall recommendation as made by the ExA for the FFC pSPA. The Secretary of State agrees with the recommendations of the ExA, NE and the Applicant and is satisfied that the potential increased fulmar displacement mortality as a result of the Project in-combination with other plans and projects would not represent an adverse effect upon the integrity of the FFC pSPA. For this conclusion he places particular weight on the advice of NE that fulmar have an extensive foraging range and low sensitivity to displacement.

[26] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002061-RsPB.pdf
[27] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002063-NE%20Response.pdf
[28] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002063-NE%20Response.pdf

Overall Conclusion for the Flamborough and Filey Coast pSPA

6.118 A likely significant effect upon the interest features of the FFC pSPA was identified because of the potential for the Project, both alone and in-combination with other plans and projects, to increase collision mortality and/or displacement mortality rates of a number of site ornithological qualifying features. The potential for adverse effect on integrity upon each of the qualifying features is set out below.

Black-legged kittiwake

6.119 A LSE upon the kittiwake interest feature of the FFC pSPA and FHBC SPA was identified because of the potential for the Project, both alone and in-combination with other plans and projects, to increase the risk of collision mortality during the operational phase.

6.120 NE state that the advice provided on the FFC pSPA also applies to the kittiwake feature of the FHBC SPA [RR-021]. The Applicant also advised that its assessment and conclusions about effects on FFC pSPA also apply to FHBC SPA [REP3-014]. The ExA stated that it has considered the implications for both of these sites in view of the draft conservation objectives for FFC pSPA.

6.121 The principal issues raised during the Examination with regard to ornithological collision impacts at the FFC pSPA and FHBCSPA relate to the relative merits of alternative methodological approaches to the assessment of those impacts.

6.122 The Applicant advised that, in order to reduce ornithological collision impacts, in particular on the kittiwake population, there would be a reduction in the project's design envelope.

6.123 PVA modelling undertaken by the Applicant indicates that the resulting levels of mortality predicted to arise from the Project alone and in-combination with other plans and projects would not be sufficient for the population to decline below the FFC pSPA citation for this species.

6.124 Despite methodological disagreements NE was able to agree that, using its preferred approach to analysis, it could conclude that there would be no adverse effect on the integrity of the kittiwake feature of the FFC pSPA from the project alone or in-combination, subject to the mitigation submitted by the Applicant

6.125 Using its preferred approach to analysis RSPB was unable to reach a conclusion of no adverse effect on the integrity of the FFC pSPA from the project alone or in-combination.

6.126 The ExA stated that it has taken into account the views of the Applicant, NE and RSPB during the examination and concludes that there is no adverse effect for the kittiwake species on the integrity of the FFC pSPA from the Project alone or in-combination.

6.127 The Secretary of State recognises the methodological disagreements between the parties and welcomes the approach of presenting a range of collision risk estimates. He has considered the representations made by the Applicant, NE and the RSPB and the recommendation as made by the ExA. The Secretary of State is satisfied that, taking into account the mitigation proposed by the Applicant, the potential increased kittiwake collision mortality as a result of the Project alone

and in-combination with other plans and projects, would not represent an adverse effect upon the integrity of the FFC pSPA.

Northern Gannet

6.128 A likely significant effect upon the gannet interest feature of the FFC pSPA was identified because of the potential for the Project, both alone and in-combination with other plans and projects, to lead to collision mortality and displacement.

6.129 The Applicant concluded that there would be no adverse effect on the integrity of the gannet feature of the FFC pSPA from collision-related mortality from the Project alone or in-combination.

6.130 While NE maintained their position on the choice of flight height data, Band model and AR, they were able to undertake their own analysis of the figures and reach a conclusion of no adverse effect on integrity on the gannet feature of the FFC pSPA.

6.131 Due to many outstanding issues of disagreement RSPB was unable to reach a conclusion of no adverse effect on integrity on the gannet feature of the FFC pSPA.

6.132 The ExA stated that it has taken into account the arguments advocated, and the data provided, by the Applicant, NE and the RSPB. The ExA agreed with the Applicant and NE that, on the basis of its Examination and of objective scientific evidence, there is no adverse impact for the gannet species on the integrity of the FFC pSPA of the project alone or in-combination.

6.133 The Secretary of State recognises the methodological disagreements between the parties and welcomes the approach of presenting a range of collision risk estimates. He has considered the representations made by the Applicant, NE and the RSPB and the recommendation as made by the ExA. The Secretary of State agrees with the recommendations of the ExA, NE and the Applicant and is satisfied that the potential increased gannet collision mortality and displacement as a result of the Project alone and in-combination with other plans and projects would not represent an adverse effect upon the integrity of the FFC pSPA.

Auk species (common guillemot, razorbill and puffin)

6.134 A LSE upon the auk species interest features of the FFC pSPA (guillemot, razorbill and puffin) was identified because of the potential for the Project, both alone and in-combination with other plans and projects, to lead to displacement of these species during the operational phase.

6.135 The Applicant concluded no adverse effects on the integrity of the FFC pSPA for guillemot, razorbill and puffin.

6.136 Despite the differing methodological approaches to calculating displacement mortality from the Applicant, NE advised that it could also conclude no adverse effects on the integrity of the FFC pSPA for guillemot, razorbill and puffin

6.137 In contrast, the RSPB maintained its objection to the Project for these species and was unable to rule out adverse effect on integrity.

6.138 The ExA stated that, having taken a balanced view of the sensitivity of the mortality displacement impacts to the methodology used and to the levels of precaution built into the process, it agrees that, on the basis of its examination and of objective scientific evidence, there are no adverse impacts for the various auk species on the integrity of the FFC pSPA from the project alone or in-combination with other plans and projects.

6.139 The Secretary of State recognises the methodological disagreements between the parties. He has considered the representations made by the Applicant, NE and the RSPB and the recommendation as made by the ExA. The Secretary of State agrees with the recommendations of the ExA, NE and the Applicant and is satisfied that the potential increased auk species displacement mortality as a result of the Project alone and in-combination with other plans and projects would not represent an adverse effect upon the integrity of the FFC pSPA.

Fulmar

6.140 A LSE upon the Fulmar interest feature of the FFC pSPA was identified because of the potential for the Project, both alone and in-combination with other plans and projects, to lead to displacement of fulmar during the operational phase.

6.141 In the Applicant's view the small number of mortalities predicted as a result of displacement and the precautionary nature of the assessment during the breeding season means it is unlikely there would be an adverse effect on the fulmar component of the FFC pSPA assemblage feature from the Project alone or in-combination.

6.142 The Secretary of State wrote to Interested Parties during the decision period to seek clarification on figures from the Applicant's HRA Report and request that NE provide clarity on its conclusions. The Applicant, NE and RSPB provided responses on 27 June 2016.

6.143 The Applicant's response of 27 June 2016, revised upwards the annual fulmar displacement mortality for FFC pSPA, based on the 2012 population estimates. The Applicant concluded that the conclusions arrived at in their original HRA Report remain valid, that there is no potential for adverse effect on integrity.

6.144 NE's response of 27 June 2016 stated that NE considered that potential displacement impacts on fulmar from the Project alone and in-combination with other plans and projects are unlikely to be significant, and would therefore not adversely affect the integrity of the breeding bird assemblage at FFC pSPA, of which fulmar is a named component.

6.145 RSPB responded that the 2015 FFC pSPA population estimates should be used. RSPB also suggested that the Applicant presents a range of possible displacement and mortality figures.

6.146 The Secretary of State wrote again to Interested Parties on 12 July 2016 requesting any observations on the Applicant's submission of 27 June 2016, in particular on the adequacy of the revised figures. The RSPB responded, making the same suggestion to use the 2015 population estimates. However, the Applicant responded to say that there is currently no 2015 population count currently available.

6.147 The Secretary of State has considered the representations made by the Applicant, the responses to his consultations from the Applicant, NE and the RSPB and the overall recommendation made by the ExA for FFC pSPA. The Secretary of State agrees with the recommendations of the ExA, and the views of NE and the Applicant and is satisfied that the potential increased fulmar displacement mortality as a result of the Project alone and in-combination with other plans and projects would not represent an adverse effect upon the integrity of the FFC pSPA.

Overall Conclusion on the FFC pSPA

6.148 **The Secretary of State recognises the methodological disagreements between the parties. He has considered the representations made by the Applicant, NE and the RSPB and the recommendation as made by the ExA. The Secretary of State agrees with the recommendations of the ExA, and the views of NE and the Applicant and is satisfied that the Project alone and in-combination with other plans and projects would not represent an adverse effect upon the integrity of the FFC pSPA.**

Flamborough Head and Bempton Cliffs SPA

7. Flamborough Head is located on the central Yorkshire coast of eastern England. The site supports large numbers of breeding seabirds including kittiwake and auks, as well as the only mainland-breeding colony of gannet in the UK. The seabirds feed and raft in the waters around the cliffs, outside the SPA, as well as feeding more widely in the North Sea. The intertidal chalk platforms are also used as roosting sites, particularly at low water and notably by juvenile kittiwakes.

7.1. The conservation objectives for FHBC SPA are the same as the conservation objectives for FHBC SPA. These are set out in Table 17 below.

Table 17: **Conservation Objectives for Flamborough Head and Bempton Cliffs SPA**

Conservation Objectives	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; • The extent and distribution of the habitats of the qualifying features • The structure and function of the habitats of the qualifying features • The supporting processes on which the habitats of the qualifying features rely • The population of each of the qualifying features, and, • The distribution of the qualifying features within the site.

7.2. A LSE upon the kittiwake feature of the FHBC SPA and FFC pSPA was identified because of potential for the Project, both alone and in-combination with other plans and projects, to increase the risk of collision mortality during the operational phase.

7.3. The Applicant stated that its assessment and conclusions about effects on FFC pSPA also apply to FHBC SPA [REP3-014]. NE also stated that advice provided on the FFC pSPA also applies to the FHBC SPA [RR-021].

7.4. The ExA advised that its assessment of the effects of the Project, alone and in-combination, on the FFC pSPA, has considered, in detail, all the impacts expected to affect the kittiwake interest feature for the original FHBC SPA. It goes on to say that, given the overlap in the interest features of the two sites, the assessment is therefore not repeated. The ExA concludes that on the basis of the previous assessments and conclusions for kittiwake at the FFC pSPA, it is satisfied that the Project, alone and in-combination with other plans and projects, will not have an adverse effect upon the integrity of the FHBC SPA.

7.5. The Secretary of State's assessment for the FFC pSPA (in section 6) has considered in detail the impact upon the kittiwake feature of both the FFC pSPA and the FHBC SPA. Given the overlap of the interest feature between the two sites, the Secretary of State considers that there is no requirement to repeat the assessment of the impacts of the Project for the features of the FHBC SPA. For a detailed assessment of the impacts, please refer to section 6.

7.6. On the basis of the analysis and conclusions reached in section 6, **the Secretary of State is satisfied that the Project, when considered both alone and in-combination with other plans and projects, will not have an adverse effect upon the integrity of the FHBC SPA**.

Forth Islands SPA

8.1 The Firth of Forth Islands are located in or near to the Firth of Forth on the east coast of central Scotland. The SPA comprises a number of separate islands or island groups, principally Inchmickery (together with the nearby Cow and Calves) off Edinburgh, Fidra, Lamb and Craigleith together with the Bass Rock off North Berwick, and the much larger Isle of May in the outer part of the Firth. The site also includes additional other small islands.

8.2 The islands support important numbers of a range of breeding seabirds, in particular terns, auks and gulls. The seabirds feed outside the SPA in nearby waters, as well as more distantly in the North Sea.

8.3 The fulmar population of the Forth Islands SPA is estimated as being 569 (2012 count); it is designated as part of the breeding bird assemblage of the Forth Islands SPA.

8.4 The conservation objectives for the Forth Islands SPA can be seen below in table 18.

Table 18: Conservation Objectives for the Forth Islands SPA

Conservation Objectives	To avoid deterioration of habitats of the qualifying species (listed below) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species that the following are maintained in the long term: ➢ Population of the species as a viable component of the site; ➢ Distribution of the species within site; ➢ Distribution and extent of habitats supporting the species; and ➢ No significant disturbance of the species. This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: ➢ Arctic tern *Sterna paradisaea* ➢ Common tern *Sterna hirundo* ➢ Roseate tern *Sterna dougallii* ➢ Sandwich tern *Sterna sandvicensis* This site also qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: ➢ Gannet *Morus bassanus* ➢ Lesser black-backed gull *Larus fuscus* ➢ Puffin *Fratercula arctica* ➢ Shag *Phalacrocorax aristotelis* The site also qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 seabirds (a seabird assemblage of international importance).

8.5 Whilst the proposed offshore windfarm site is located 345 km from the Forth Islands SPA, the Applicant identified that fulmar, a species that forms part of the seabird assemblage feature, could be impacted while foraging in the area of the Project. The Applicant's HRA Screening report demonstrated that no other qualifying species from the SPA were likely to be present within the Project area.

8.6 A LSE upon the Forth Islands SPA site was identified because of the potential for the operational array (alone and in-combination with other plans and projects) to cause displacement of fulmar in the breeding, pre-breeding, post-breeding and non-breeding seasons.

Fulmar: Alone assessment

8.7 The Applicant's original displacement analysis predicted a mortality of 4 fulmar during the breeding season [APP-0171], based on a displacement rate of 30% and mortality rate of 2%. This represents 0.254% of the SPA citation population. For the other seasons the predicted mortality is 0. In the Applicant's view the small number of mortalities predicted as a result of displacement and the precautionary nature of the assessment during the breeding season means it is unlikely there would be an adverse effect on the fulmar component of the Forth Islands SPA assemblage feature from the Project alone.

8.8 The Secretary of State wrote to Interested Parties on 26 May 2016 regarding the Applicant's assessment of displacement of fulmar at three sites, including the Forth Islands SPA[29]. In this the Secretary of State sought clarification on figures from the Applicant's HRA Report and requested the Applicant revisit a number of specified areas of the report in order to provide the necessary clarity required for him to fully assess the implications of the Project. The Applicant[30] and RSPB[31] provided responses relevant to this SPA on 27 June 2016.

8.9 The Applicant's response of 27 June 2016, revised upwards the annual fulmar displacement mortality for Forth Islands SPA, based on the 2012 population estimates, to 5 birds, which represents 0.44% of the fulmar SPA population. The Applicant concluded that on this basis, the conclusions arrived at in their original HRA Report remain valid, that there is no potential for adverse effect on integrity.

8.10 The RSPB responded to suggest that the Applicant should present a range of possible displacement and mortality figures.

8.11 The Secretary of State wrote again to Interested Parties on 12 July 2016[32] requesting any observations on the Applicant's submission of 27 June 2016, in particular on the adequacy of the revised figures. Scottish National Heritage (SNH) responded on 15 July 2016[33], stating that a conclusion of no Likely Significant Effect can be reached for the Forth Islands SPA.

Conclusions

8.12 The Secretary of State has considered the representations made by the Applicant, the responses to his consultation from the Applicant, SNH and the RSPB. The Secretary of State

[29] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-001315-DECC%20consultation%20letter%20Hornsea%20Offshore%20Windfarm%20(Zone%204)%20-Project.pdf
[30] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002009-Hornsea%20Project%202-%20Response%20to%20Topic%202%20-%20Fulmar%20Displacement%20Mortality.pdf
[31] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002000-RSPB%20Response%20to%20Request%20for%20Comments%20on%20the%20Application%20for%20the%20Proposed%20Hornsea%202%20Offshore%20Wind%20Farm.pdf
[32] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002054-12%20July%20%20DECC%20consultation%20letter%20HORNSEA%20Project%202.pdf
[33] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002057-SNH%20.pdf

agrees with the views of the Applicant and SNH and is satisfied that the potential increased fulmar displacement mortality as a result of the Project alone would not result in an adverse effect upon the integrity of the Forth Islands SPA.

Fulmar: In-combination assessment.

8.13 The Applicant's response of 27 June 2016 to the Secretary of State's consultation considered displacement mortalities associated with Inch Cape and Hornsea Project 1 to give two in-combination figures: one based on the Forth Islands SPA citation population estimates and the other based on 2012 population estimates. Using the citation population estimate, a displacement mortality of 5 birds was predicted for the Project in-combination with other plans and projects (0.31 of the SPA population). Using the 2012 population estimate, a displacement mortality of 7 birds was predicted for the Project in-combination with other plans and projects (0.62 of the SPA population). In the Applicant's view, this increase in baseline mortality is likely to be sustainable and no adverse effect is predicted. The Applicant concluded that on this basis, the conclusions arrived at in their original HRA Report remain valid, that there is no potential for adverse effect on site integrity due to displacement mortality from the Project, in-combination with other projects on the fulmar component of the Forth Islands SPA assemblage feature.

8.14 The RSPB also responded on 27 June 2016 to this consultation to suggest that the Applicant should present a range of possible displacement and mortality figures[34].

8.15 The Secretary of State wrote again to Interested Parties on 12 July 2016[35] requesting any observations on the Applicant's submission of 27 June 2016, in particular on the adequacy of the revised figures. Scottish National Heritage (SNH) responded on 15 July 2016[36], stating that a conclusion of no Likely Significant Effect and therefore no adverse effect on integrity can be reached for the Forth Islands SPA.

Conclusions

8.16 The Secretary of State has considered the representations made by the Applicant and the responses to his consultation from the Applicant, SNH and the RSPB. The Secretary of State agrees with the views of the Applicant and SNH and is satisfied that the potential increased fulmar displacement mortality as a result of the Project in-combination with other plans and projects would not result an adverse effect upon the integrity of the Forth Islands SPA.

[34] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002000-RSPB%20Response%20to%20Request%20for%20Comments%20on%20the%20Application%20for%20the%20Proposed%20Hornsea%202%20Offshore%20Wind%20Farm.pdf
[35] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002054-12%20July%20%20DECC%20consultation%20letter%20HORNSEA%20Project%202.pdf
[36] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002057-SNH%20.pdf

Fowlsheugh SPA

9.1 Fowlsheugh is located on the east coast of Aberdeenshire in north-east Scotland, overlooking the North Sea. The sheer cliffs are between 30-60 m high and are cut mostly in basalt and conglomerate of Old Red Sandstone age.

9.2 They form a rock face with diverse structure providing ideal nesting sites for seabirds. The cliffs support major numbers of breeding seabirds, especially gulls and auks. The seabirds feed outside the SPA in nearby waters, as well as more distantly in the North Sea.

9.3 The fulmar population of the Fowlsheugh SPA is estimated as being 119 (2008-2012); it is designated as part of the breeding bird assemblage of the Forth Islands SPA.

9.4 The conservation objectives for the Fowlsheugh SPA can be seen below in table 19.

Table 19: Conservation Objectives for the Fowlsheugh SPA

Conservation Objectives	To avoid deterioration of habitats of the qualifying species (listed below) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species that the following are maintained in the long term: ➢ Population of the species as a viable component of the site; ➢ Distribution of the species within site; ➢ Distribution and extent of habitats supporting the species; and ➢ No significant disturbance of the species. This site qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: ➢ Guillemot *Uria aalge* ➢ Kittiwake *Rissa tridactyle* The area also qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 seabirds (a seabird assemblage of international importance).

9.5 Whilst the proposed offshore windfarm site is located 394 km from the Fowlsheugh SPA, the Applicant identified that fulmar, a species that forms part of the seabird assemblage feature, could be impacted while foraging in the area of the Project. The Applicant's HRA Screening report demonstrated that no other qualifying species from the SPA were likely to be present within the Project area.

9.6 A LSE upon the Fowlsheugh SPA site was identified because of the potential for the operational array (alone and in-combination with other plans and projects) to cause displacement of fulmar in the breeding, pre-breeding, post-breeding and non-breeding seasons.

Fulmar: Alone assessment

9.7 The Applicant's original displacement analysis predicted a mortality of 6 fulmar during the breeding season [APP-0171], based on a displacement rate of 30% and mortality rate of 2%. This represents 0.264% of the SPA citation population. For the other seasons the predicted mortality is 0. In the Applicant's view the small number of mortalities predicted as a result of displacement and the precautionary nature of the assessment during the breeding season means it is unlikely there would

be an adverse effect on the fulmar component of the Fowlsheugh SPA assemblage feature from the Project alone.

9.8 The Secretary of State wrote to Interested Parties on 26 May 2016 regarding the Applicant's assessment of displacement of fulmar at three sites, including the Fowlsheugh SPA[37]. In this the Secretary of State sought clarification on figures from the Applicant's HRA Report and requested the Applicant revisit a number of specified areas of the report in order to provide the necessary clarity required for him to fully assess the implications of the Project. The Applicant[38] and RSPB[39] provided responses relevant to this SPA on 27 June 2016.

9.9 The Applicant's response of 27 June 2016, revised downwards the annual fulmar displacement mortality for Fowlsheugh SPA, based on the 2008-2012 population estimates, to 1 bird, which represents 0.42% of the fulmar SPA population. The Applicant concluded that on this basis, the conclusions arrived at in their original HRA Report remain valid, that there is no potential for adverse effect on integrity.

9.10 The RSPB responded to suggest that the Applicant should present a range of possible displacement and mortality figures.

9.11 The Secretary of State wrote again to Interested Parties on 12 July 2016[40] requesting any observations on the Applicant's submission of 27 June 2016, in particular on the adequacy of the revised figures. Scottish National Heritage (SNH) responded on 15 July 2016[41], stating that a conclusion of no likely significant effect and therefore no adverse effect on integrity can be reached for the Fowlsheugh SPA.

Conclusions

9.12 The Secretary of State has considered the representations made by the Applicant and the responses to his consultation from the Applicant, SNH and the RSPB. The Secretary of State agrees with the views of the Applicant and SNH and is satisfied that the potential increased fulmar displacement mortality as a result of the Project alone would not represent an adverse effect upon the integrity of the Fowlsheugh SPA.

Fulmar: In-combination assessment.

9.13 The Applicant's response of 27 June 2016 considered displacement mortalities associated with Inch Cape and Hornsea Project 1 to give two in-combination figures: one based on the Fowlsheugh SPA citation population estimates and the other based on 2008-2012 population estimates. Using the citation population estimate, a displacement mortality of 9 birds was predicted for the Project in-combination with other plans and projects (0.38 of the SPA population). Using the 2012 population

[37] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-001315-DECC%20consultation%20letter%20Hornsea%20Offshore%20Windfarm%20(Zone%204)%20-Project.pdf
[38] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002009-Hornsea%20Project%202-%20Response%20to%20Topic%202%20-%20Fulmar%20Displacement%20Mortality.pdf
[39] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002000-RSPB%20Response%20to%20Request%20for%20Comments%20on%20the%20Application%20for%20the%20Proposed%20Hornsea%202%20Offshore%20Wind%20Farm.pdf
[40] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002054-12%20July%20%20DECC%20consultation%20letter%20HORNSEA%20Project%202.pdf
[41] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002057-SNH%20.pdf

estimate, a displacement mortality of 1 bird was predicted for the Project in-combination with other plans and projects (0.42 of the SPA population). In the Applicant's view, this increase in baseline mortality is likely to be sustainable and no adverse effect is predicted. The Applicant concluded that on this basis, the conclusions arrived at in their original HRA Report remain valid, that there is no potential for adverse effect on site integrity due to displacement mortality from the project, in-combination with other projects on the fulmar component of the Fowlsheugh SPA assemblage feature.

9.14 The RSPB also responded to this consultation to suggest that the Applicant should present a range of possible displacement and mortality figures[42].

9.15 The Secretary of State wrote again to Interested Parties on 12 July 2016[43] requesting any observations on the Applicant's submission of 27 June 2016, in particular on the adequacy of the revised figures. Scottish National Heritage (SNH) responded on 15 July 2016[44], stating that a conclusion of no Likely Significant Effect and therefore no adverse effect on integrity can be reached for the Fowlsheugh SPA.

Conclusions

9.16 The Secretary of State has considered the representations made by the Applicant, the responses to his consultation from the Applicant, SNH and the RSPB. The Secretary of State agrees with the views of the Applicant and SNH and is satisfied that the potential increased fulmar displacement mortality as a result of the Project in-combination with other plans and projects would not represent an adverse effect upon the integrity of the Fowlsheugh SPA.

[42] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002000-RSPB%20Response%20to%20Request%20for%20Comments%20on%20the%20Application%20for%20the%20Proposed%20Hornsea%202%20Offshore%20Wind%20Farm.pdf

[43] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002054-12%20July%20%20DECC%20consultation%20letter%20HORNSEA%20Project%202.pdf

[44] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002057-SNH%20.pdf

Humber Estuary SPA and Ramsar

10.1 There is significant overlap between SPA and Ramsar designations, so for the purposes of this assessment the Ramsar designation is considered in parallel with the SPA designation and all relevant species are considered together where they are a feature of more than one site. Meeting the conservation objectives for the SPA would also ensure that the Ramsar criteria are met.

10.2 The Humber Estuary SPA and Ramsar site protects the avian interest features (and their supporting habitats) of the Humber Estuary. The extensive mudflats and saltmarsh provide important habitats for many species of bird.

10.3 The Conservation Objectives for the Humber Estuary SPA can be seen below in table 20. The Conservation Objectives have been used to inform this HRA.

Table 20: Conservation Objectives for the Humber Estuary SPA

Conservation Objectives for the Humber Estuary SPA	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; ➢ The extent and distribution of the habitats of the qualifying features; ➢ The structure and function of the habitats of the qualifying features; ➢ The supporting processes on which the habitats of the qualifying features rely; ➢ The population of each of the qualifying features, and, ➢ The distribution of the qualifying features within the site. The qualifying features to which the conservation objectives refer are: ➢ *Botaurus stellaris*; Great bittern (Non-breeding) ➢ *Botaurus stellaris*; Great bittern (Breeding) ➢ *Tadorna tadorna*; Common shelduck (Non-breeding) ➢ *Circus aeruginosus*; Eurasian marsh harrier (Breeding) ➢ *Circus cyaneus*; Hen harrier (Non-breeding) ➢ *Recurvirostra avosetta*; Pied avocet (Non-breeding) ➢ *Recurvirostra avosetta*; Pied avocet (Breeding) ➢ *Pluvialis apricaria*; European golden plover (Non-breeding) ➢ *Calidris canutus*; Red knot (Non-breeding) ➢ *Calidris alpina alpina*; Dunlin (Non-breeding) ➢ *Philomachus pugnax*; Ruff (Non-breeding) ➢ *Limosa limosa islandica*; Black-tailed godwit (Non-breeding) ➢ *Limosa lapponica*; Bar-tailed godwit (Non-breeding) ➢ *Tringa totanus*; Common redshank (Non-breeding) ➢ *Sterna albifrons*; Little tern (Breeding) ➢ Waterbird assemblage

10.4 A LSE upon the Humber Estuary SPA and Ramsar site was identified because of the potential for construction works and operation and maintenance activities (where the export cable comes onshore) to cause disturbance and displacement of waterbird species.

10.5 Due to the intrinsic link between the birds and the habitats upon which they rely, the conservation objectives focus in part on protecting the supporting habitat. However, because the proposed cabling works do not significantly affect important habitat areas over a prolonged period, the key question that this assessment must address is whether the works to bring the cable onshore would disturb and displace bird features for a period sufficient to cause an adverse effect upon the populations. The breeding features do not use the coast around the landfall and so the

assessment of disturbance and displacement can be refined further to include the overwintering and passage features only.

10.6 Displacement, caused by birds avoiding the area around the cable works, reduces the amount of roosting and associated feeding habitat available. This could cause the density of birds feeding in other areas to increase such that there may be less food available per individual than there would have been otherwise.

10.7 The effects of disturbance prevent birds from roosting or feeding in an area which they would otherwise use. This can mean that birds can struggle to get sufficient food to meet their energy requirements. Ultimately, if these requirements cannot be met then the birds can starve to death. Depending on the nature of the disturbance, the impacts on the birds can be exacerbated. If the disturbance is sufficient to cause birds in surrounding areas to fly away, then not only are the birds not spending their time roosting and feeding, but they are also using extra energy to fly.

10.8 Different species of birds will respond differently to disturbance, some are more tolerant than others. For example, different species may react differently to noise disturbance than they would to a visual disturbance. However, no species will tolerate all forms of disturbance within an area.

10.9 The wide range of bird species found in the Humber Estuary SPA and Ramsar are particularly sensitive to works within the overwintering period. During the overwintering period, birds use more energy keeping warm than they do at other times of the year. It is therefore important that they are able to source enough food to meet the additional energy requirements otherwise they risk starvation.

10.10 Outside of the wintering period, this effect is not as significant because the energy requirements of the birds are lower as they are expending less energy on keeping warm. There is typically sufficient food available to meet the required energy needs.

10.11 The Applicant assessed the impact of noise, vibration and visual disturbance on individual SPA and Ramsar Site species during export cable installation and operation [APP-0171]. The in-combination assessment included the following projects: Phillips 66 Replacement Pipeline; Able Marine Energy Park; Killingholme (quay and wind turbine manufacturing factory); Grimsby Docks Flood Risk Management Scheme; Bishopsthorpe Farm (8 wind turbine development); Green Port Hull; and HP1. Based on the Applicant's assessment, all projects identified for potential in-combination/cumulative impacts in relation to birds at the export cable landfall for the Project were screened out, largely on the basis of no temporal overlap with the Project, with the exception of the Hornsea Project 1. However, the Applicant concluded that there would be no adverse effect on the SPA features resulting from the project alone and in-combination with Hornsea Project 1, a conclusion that was challenged throughout the examination of the project.

10.12 During examination, discussions focused on waterbird roosts in the vicinity of the intertidal cable route. The RSPB and NE expressed concern that these roosts could potentially be disturbed by construction or operation and maintenance activities on the intertidal during the overwintering and passage periods [RR-021, REP1-037 and REP1-047]. The RSPB were particularly concerned about the annual construction window spanning months when passage bird features use the SPA for roosting. The RSPB also expressed concern about duration of the intertidal construction works,

lasting potentially up to five sequential years and, combined with Hornsea Project 1, this could extend to seven years [REP1-047, REP2-015 and REP3-041].

10.13 Concerns in relation to construction impacts in the overwintering and passage periods were largely dealt with by amending temporal working restrictions in the Transmission Assets DMLs A2 and B2. Condition 18(3) of the deemed Marine Licences A2 and B2 now ensures that construction or installation of licensable activities can only occur outside of the overwintering period (the DCO defines the overwintering period as the period between 1 October and 31 March (inclusive)) unless otherwise agreed in writing with the MMO, in consultation with NE. To account for the passage period, Condition 18(4) ensures that, between 1 April and 31 May, and between 1 August and 30 September, works cannot be undertaken within 500 metres seaward of the seawall during the 2 hour period either side of a high tide predicted to be greater than 6.5 metres Chart Datum, unless provided for in the construction and monitoring programme submitted and approved under Condition 8(2)(a) or the construction method statement submitted and approved under Condition 8(2)(b) or unless otherwise agreed in writing by the MMO, in consultation with NE.

10.14 These restrictions were welcomed by the RSPB, but only in part. The RSPB argued that a tailpiece in Condition 18(3) and rider in Condition 18(4) would negate the conditions the provisions introduce [REP8-004]. However, the Applicant argued that the wording introduces flexibility, which is required in order to cover a situation where, for example, construction were to experience unforeseen delays and require a very limited overlap with the onset of the overwintering period to achieve completion [REP3-013, REP4-006, REP5-001 and REP 6 004]. The Applicant noted that, pursuant to Condition 17(2) of the DMLs, such works would only be permitted if the Applicant could demonstrate to the satisfaction of the MMO (in consultation with NE) that such works are unlikely to give rise to any materially new or materially different environmental effects from those assessed in the ES. The MMO confirmed that it is content with the current wording of the condition but noted that if such a proposal is likely then it would be more beneficial if this could be resolved prior to determination [REP4-006]. NE also agreed the wording of this condition [REP1-0101].

10.15 In undertaking the AA for the Humber Estuary SPA and Ramsar, the Secretary of State has concluded that Condition 18 requires further clarity in order for him to conclude that the project will not have an adverse effect on the site's intertidal ornithological features, should construction activities be required to take place outside of the agreed periods. The Secretary of State agrees that any alternative to what is otherwise provided for under Condition 18 should not be agreed unless it is in accordance with the principles and assessments set out in the environmental statement; and agreement to any alternative should be given only where it has been demonstrated to the satisfaction of the MMO that the alternative is unlikely to give rise to any materially new or materially different effects from those assessed in the environmental statement. The Secretary of State considers that, rather than relying on Condition 17, it is desirable for this to be made clear within Condition 18 itself. Therefore, the Secretary of State has amended Condition 18 (see Condition 18(6)) to provide additional clarity, which ensures the above safeguards are in place.

10.16 The RSPB also raised a number of concerns about the adequacy of the monitoring provisions in relation to intertidal ornithological impacts [REP2-015, REP3-041 and REP4-053]. The RSPB considered that the detail contained in the outline Code of Construction Practice ("CoCP") is lacking

and suggested that the role of the Ecological Clerk of Works (ECOW) should be described in it. The RSPB also suggested that the ECOW's role should include the ability to request a temporary suspension of work if significant disturbance was anticipated. However, the Applicant considered this unnecessary because a measure such as this would only be required if adverse effects could not be ruled out.

10.17 NE confirmed that it is satisfied with the scope of content of the outline CoCP [REP4-048]. The MMO also confirmed that it is satisfied with the scope of the outline CoCP [REP4-047]. Towards the close of the Examination the RSPB suggested a number of other amendments to various clauses of the DCO/DMLs, in relation to the monitoring of intertidal issues. Whilst recognising the sentiment behind such proposals, the ExA agreed with the conclusions of NE and MMO that they are satisfied with the provisions already in place in the DCO/DMLs for the monitoring and management of intertidal impacts.

10.18 In its final submission of examination [REP7-036], the RSPB remained concerned about the degree of flexibility sought by the Applicant in relation to phased construction timings. Given that a restriction on ducting to the first phase of intertidal works would reduce the potential for intertidal impacts, the RSPB considered it necessary to include this as a provision within the DCO. However, the Applicant did not agree that such a requirement is necessary or appropriate, given that, in any case, the undertaker may not carry out any works under the DCO which are outside the scope of the assessments in the ES. The Applicant also noted that the CoCP will regulate the proposed construction programme and is required to be submitted to the local planning authority and the MMO (in consultation with NE) for approval prior to the commencement of the works.

10.19 With regards to the operational phase, concerns were raised by NE (with support from RSPB) in relation to proposed maintenance activities and inspections. In NE's view, these activities were likely to significantly affect the SPA's overwintering features if the timing and scale of operations were left unregulated. Agreement was reached between the Applicant and NE through Conditions 18(5) of the DMLs A2 and B2. This restricts inspections from being carried out during the overwintering period if they are to be undertaken by more than five people or over more than two consecutive days without a subsequent approval from the MMO in consultation with NE or unless provided for within the offshore project maintenance plan which is required to be approved by the MMO in consultation with NE [REP5-026 and REP7-034].

10.20 With the various conditions, which are described above, in place, NE advised the ExA that the Project would not have an adverse effect upon the integrity of the Humber Estuary SPA and Ramsar site alone and in-combination [REP5-026 and REP5-036]. The ExA reached the same conclusion, but in regards to in-combination effects, the ExA highlighted that, given the fact that now Dong Energy has ownership for both HP2 and HP1, any opportunities for sharing work in the intertidal area (for example, in relation to ducting activities) would hopefully be taken to minimise intertidal impacts.

10.21 **The Secretary of State is satisfied that the DCO/DMLs have sufficient safeguards built in to ensure that the impacts of the Hornsea 2 project, either alone or in-combination with other plans and projects, will not have an adverse effect upon the integrity of the Humber Estuary SPA and Ramsar site. The Secretary of State is mindful that Hornsea Project 1 and Hornsea**

Project 2 have the same owners and, whilst the Secretary of State concludes no adverse effect on integrity, he would recommend that any opportunity to share work in the intertidal would be of benefit, where practically possible.

Humber Estuary SAC and Ramsar

11.1 There is significant overlap between SAC and Ramsar designations, so for the purposes of this assessment the Ramsar designation is considered in parallel with the SAC designation and all relevant species are considered together where they are a feature of more than one site. Meeting the conservation objectives for the SAC would also ensure that the Ramsar criteria are met.

11.2 The Humber is the second largest coastal plain Estuary in the UK, and the largest coastal plain estuary on the east coast of Britain. The estuary supports a full range of saline conditions from the open coast to the limit of saline intrusion on the tidal rivers of the Ouse and Trent. The range of salinity, substrate and exposure to wave action influences the estuarine habitats and the range of species that utilise them.

11.3 The Annex I qualifying habitats of the site are as follows:

- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- Coastal lagoons
- Dunes with *Hippophae rhamnoides*
- Embryonic shifting dunes
- Estuaries
- Mudflats and sandflats not covered by seawater at low tide
- Fixed dunes with herbaceous vegetation (`grey dunes`)
- *Salicornia* and other annuals colonising mud and sand
- Sandbanks which are slightly covered by sea water all the time
- Shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes')

11.4 The Annex II qualifying species are:

- Grey seal *Halichoerus grypus*
- River lamprey *Lampetra fluviatilis*
- Sea lamprey *Petromyzon marinus*

11.5 The Conservation Objectives for the Humber Estuary SAC can be seen below in table 21. The Conservation Objectives have been used to inform this Habitats Regulations Assessments.

Table 21: Conservation Objectives for the Humber Estuary SAC (Natural England 2014)

Conservation Objectives for the Humber Estuary SAC	*With regard to the natural habitats and/or species for which the site has been designated, and subject to natural change;* *Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;* • *The extent and distribution of qualifying natural habitats and habitats of qualifying species* • *The structure and function (including typical species) of qualifying natural habitats* • *The structure and function of the habitats of qualifying species* • *The supporting processes on which qualifying natural habitats and habitats of qualifying species rely*

	• *The populations of qualifying species, and,* • *The distribution of qualifying species within the site.*

11.6 The areas of likely significant effect identified for the Humber Estuary SAC and Ramsar were due to temporary disturbance/loss of habitat and increased suspended sediment concentrations and deposition during construction, construction noise impacts and electro-magnetic field related effects during operation and maintenance. The features of the sites potentially affected are Annex I habitats, river lamprey, sea lamprey and grey seal.

Annex I Habitats

11.7 The Applicant considered potential effects on Annex I habitats of the Humber Estuary SAC and Ramsar associated with temporary habitat disturbance or loss [APP-0171]. The Applicant noted that temporary disturbance/loss of habitat may occur on habitat features of the Humber Estuary SAC and Humber Estuary Ramsar site during the construction phase as a result of cable installation activity. The total maximum area of intertidal temporary direct habitat loss/disturbance is estimated at approximately 1,541,790 m².

11.8 The Applicant summarised habitat loss as temporary, the largest temporary impact was predicted to be on *Salicornia* and mudflats and sandflats (4.62% and 1.83% of this habitat within the SAC for the project alone and in-combination respectively). The ExA report [paragraph 6.7.102] states that this type of habitat has a high recovery potential, estimated to be within one year of cable installation for the project.

11.9 The Applicant proposed mitigation measures, particularly in relation to *Salicornia,* as follows:

- Works will be completed prior to the peak dispersal of *Salicornia* seeds (i.e., September to late November) and sediment in the intertidal construction area will be returned to an elevation similar to that of the surrounding area and will be smoothed over to remove deep depressions from wheel ruts or tracks on completion of cable installation works. These measures will maximise the potential for recolonisation, allowing *Salicornia* to return to pre-disturbance densities within one year.
- In order to assess the effectiveness of the mitigation strategies proposed monitoring of this habitat at the Horseshoe Point cable route corridor landfall will be undertaken one year prior to cable burial operations and following completion of cable burial.

11.10 These mitigation measures are secured through Condition 8(2) of DMLs A2 and B2.

11.11 In addition to the above mitigation measures an Ecological Clerk of Works ("ECoW") will be employed to ensure cable installation works are properly managed in the intertidal area, and specifically to ensure direct impacts on sensitive habitat are avoided. This is secured through Condition 8(2) of DMLs A2 and B2.

11.12 Due to the small proportion of the qualifying habitats predicted to be affected, the high recoverability of habitats and the proposed mitigation measures, the Applicant concluded that there would be no adverse effect on integrity of these features of the SAC.

11.13 Changes to water quality associated with increased suspended sediment concentrations and sediment deposition may have an impact on habitat features of the Humber Estuary SAC. The

Applicant undertook modelling to assess this impact [APP-0171]. The modelling of the expected sediment plumes and sediment deposition as a result of cable installation in the intertidal suggests that impacts will be short lived and affect relatively small areas.

11.14 Background concentrations of suspended sediment within the Humber Estuary are comparatively high. Taking this into account together with the extent of the site and the temporary and short lived nature of the potential effects, significant effects in terms of long term habitat deterioration, reduction in habitat extent or impacts on its structure, function, supporting processes or typical species were not predicted by the Applicant.

11.15 The Applicant concluded that there is no indication of adverse effects on the integrity of the Humber Estuary SAC (and Ramsar) due to the potential effects of habitat disturbance and changes to water quality (due to increased suspended sediment concentrations and sediment deposition) as a result of the Project, either alone or in-combination with other plans and projects.

11.16 NE highlighted in their Relevant Representation [RR-021] that it was unclear whether it was proposed to use trailer suction hopper dredgers ("TSHD") for cable burial and whether this activity may take place within the Humber Estuary SAC. If TSHDs were to be used, further information was required on the activities involved, as well as any effects caused. Such activity could potentially destabilise and redistribute the sediment so that the form and function of the Annex I habitats are changed. The Applicant's SoCG with NE (all other matters) [REP0-0101] confirmed that TSHD's would not be used within the Humber Estuary SAC and noted that this matter was agreed between parties.

11.17 The Applicant's SoCG with NE on intertidal matters [REP5-026] highlighted that NE initially had concerns in relation to the intertidal and the Humber Estuary SAC as follows;

- Intertidal access during construction
- Intertidal access during operation

11.18 NE queried the feasibility of proposed methods for accessing the intertidal (crossing the Annex I sand dune habitats within the Humber Estuary SAC) during the construction phase [REP2-009]. NE suggested that, following the December 2013/January 2014 storms, the topography of the sand dunes present at the landfall are such that the proposed methodology for accessing the intertidal may not be feasible from an engineering perspective. On this basis, NE questioned whether more permanent structures such as earth mounds may be required to provide the necessary gradient for the access track way and that these structures would lead to long term habitat loss.

11.19 On the 20th October 2015 the Applicant provided an Intertidal Clarification Note to respond to those concerns raised by NE [REP4-027]. The note confirmed that the methodologies outlined in the Project Description for construction (and operation and maintenance) access to the intertidal are considered to be both feasible and realistic. The Applicant confirmed that there is currently no foreseeable requirement for the installation of any permanent structures to support the temporary trackway during construction. The Applicant confirmed that the access methodologies assessed will result in temporary habitat loss only to Annex I sand dune habitats, and that there will be no permanent/long-term loss of sand dune habitat as a result of construction.

11.20 The Applicant has committed to prepare an Intertidal Access Management Plan that will be submitted for approval by the local planning authority in consultation with NE prior to the commencement of works. This is secured as Requirement 24 of the DCO.

11.21 In relation to operation of the Project, NE questioned [REP2-009] whether the assessment has considered the consequence of access requirements to the beach on an annual basis throughout the operation and maintenance phase. In the Intertidal Clarification Note [REP4-027] the Applicant confirmed that they had considered operation and maintenance access across the intertidal on an annual basis. The note confirmed that operation and maintenance access arrangements, including appropriate mitigation measures, will be captured within the Intertidal Access Management Plan. The Applicant confirmed that the access methodologies assessed will result in temporary habitat loss only to Annex I sand dune habitats, and that there will be no permanent/long-term loss of sand dune habitat as a result of operational and maintenance access.

11.22 Following the provision of the Intertidal Clarification Note and the Requirement for an Intertidal Access Management Plan, NE agreed that based on the clarifications provided and commitments made by the Applicant throughout the course of the examination, there will be no adverse effect either alone or in-combination on any of the Humber Estuary SAC or Ramsar features [REP5-026].

11.23 The ExA agreed with NEs conclusions that there will be no adverse effect on integrity from the project alone or in-combination on the Annex I habitats of the Humber Estuary SAC and Ramsar.

11.24 **The Secretary of State agrees with both the Applicant, NE and the recommendation of the ExA that due to Requirements incorporated in the DCO there will not be an adverse effect on integrity on the Annex I habitat features of the Humber Estuary SAC and Ramsar, either alone or in-combination with other plans or projects.**

Annex II Features

River and Sea Lamprey

11.25 The Applicant considered potential effects on Annex II migratory fish species of the Humber Estuary SAC and Ramsar associated with increased suspended sediment concentrations and deposition during construction and electro-magnetic field (“EMF”) related effects during operation and maintenance. The species potentially affected are sea lamprey and river lamprey [APP-071].

11.26 The Applicant’s HRA [APP-071] notes that sea lamprey and river lamprey may be found in coastal and/or estuarine areas either in transit from and into home rivers and/or engaged in foraging activity. As such, the greatest potential for interaction between the Project and the Humber Estuary SAC and Ramsar is anticipated to mainly occur in the areas relevant to the subtidal and intertidal section of the export cable.

11.27 The Applicant noted that whilst river and sea lamprey are expected to transit the Humber Estuary and adjacent coastal areas as part of their normal migration and foraging activity, taking the short lived and small scale of the increased suspended sediment concentrations and therefore low magnitude of the potential effect, impacts in terms of significant disturbance, effects to the population level and/or changes in the distribution of river and sea lamprey within the sites are not

to be expected. As such, significant impacts are not anticipated on the river and sea lamprey populations of the Humber Estuary SAC and Ramsar as a result of the Project.

11.28 The Applicant noted that the background levels of suspended sediment concentrations in the Humber Estuary are naturally high (i.e., up to 260 mg/l) and therefore the river and sea lamprey populations of these European sites will be habituated to migrate through areas where high levels of suspended sediment may be present. Furthermore, given the small spatial extent of expected sediment plume, particularly in the Humber Estuary area, there would be sufficient alternative undisturbed areas available for these species to be used for migration in and out of the estuary and/or for feeding.

11.29 In relation to in-combination impacts the Applicant's HRA [APP-071] noted that other plans and projects in the Humber Estuary area are not anticipated to have potential to result in in-combination impacts in relation to increased suspended sediment concentrations and sediment deposition. The Applicant's assessment concludes that the potential for the interaction of the sediment plumes arising from both the Project and other activities considered in-combination is considered to be low. Should interaction occur (e.g., where concurrent activity occurs in very close proximity) the result is predicted to be a short term, localised increase in suspended sediment concentration (up to 5 mg/l) over that which would otherwise be expected from either activity alone. As noted above river and sea lamprey will be habituated to migrate through areas where high levels of suspended sediment may be present.

11.30 The transport of electricity through subsea power cables has the potential to emit a localised EMF which could potentially affect the sensory mechanisms of some species of fish and shellfish. The key concern in relation to EMFs and migratory fish species such as river and sea lamprey is the potential for EMF to interfere with their navigation. The Applicant noted that impacts associated with EMFs would be highly localised being limited to the immediate vicinity of the cables. In addition the export cables would be buried to a minimum target depth of 2m in the intertidal area. The Applicant stated that potential impacts are expected to be short term, potentially resulting in temporary behavioural effects rather than causing a barrier to migration [APP-071]. Consequently impacts in relation to long term significant disturbance, effects to the population level and/or changes in the distribution of river and sea lamprey within the sites are not to be expected either as a result of the project alone or in-combination with other plans or projects.

11.31 As a result significant impacts are not anticipated by the Applicant on the river and sea lamprey populations of the Humber Estuary SAC (and Ramsar) either alone or in-combination due to either increased suspended sediment concentrations and deposition during construction or electro-magnetic field ("EMF") related effects during operation and maintenance.

11.32 The RIES records that NE did not respond specifically on river and sea lamprey of the Humber Estuary SAC and Ramsar. However the Applicant's SoCG with NE on intertidal matters [REP5-026] records that, based on the clarifications provided and commitments made by the Applicant throughout the course of the examination to date, both parties agree that there will be no adverse effect either alone or in-combination on any of the Humber Estuary SAC or Ramsar features.

11.33 The ExA agrees with the Applicant that significant impacts are not anticipated on the river and sea lamprey populations of the Humber Estuary SAC and Ramsar as a result of the Project alone and in-combination with other plans or projects.

11.34 **The Secretary of State agrees with the recommendation of the ExA and the views of the Applicant that there will not be an adverse effect on integrity on the river and sea lamprey features of the Humber Estuary SAC and Ramsar, either alone or in-combination with other plans or projects.**

Grey Seal

11.35 The Humber Estuary SAC supports the second largest breeding grey seal colony in England at Donna Nook on the Lincolnshire coast and is the furthest south breeding colony on the east coast. Grey seal are present at this SAC as a qualifying feature, but are not a primary reason for site selection. On the Lincolnshire coast grey seal start to aggregate in mid-September to begin breeding. Pupping at Donna Nook commences in late October and runs until December [APP-071].

11.36 The primary source of underwater noise that may impact marine mammals during construction is that arising from pile driving activities during foundation installation. The Applicant's HRA [APP-071] notes that there are a number of factors which affect the response of marine mammals to sounds in their environment, including:

- Duration and intensity of the sound;
- The animal's tolerance and/or sensitisation to it (i.e., an animal's exposure history to a particular sound affects whether it is subsequently less likely (habituation) or more likely (sensitisation) to respond to it);
- The physical and behavioural state of the animal; and
- The prevailing acoustic characteristics and ecological features of the environment in which the animal encounters the sound.

11.37 The potential effects of piling noise on marine mammals can be categorised in three ways;

- *Lethality*, this relates to the fact that at close ranges intense underwater noise can cause injury or death.
- *Auditory injury or hearing impairment*, high noise exposure levels can also cause hearing impairment, as a temporary loss in hearing sensitivity (Temporary Threshold Shift, TTS), or a permanent loss of hearing sensitivity (Permanent Threshold Shift, PTS).
- *Behavioural effects,* at large ranges marine mammals may be affected through changes in behaviour or avoidance of the impacted area.

11.38 The Applicant investigated the potential effects of noise disturbance on grey seals [APP-071]. The Applicant reported that the effects of instantaneous injury/PTS are expected to be highly localised with effects only occurring out to a maximum of less than 500 m from the source for instantaneous injury/PTS. Assuming grey seal respond to the onset of pile driving by swimming away from the noise source, the potential for the onset of auditory injury would be expected to be mitigated by soft-start piling. This together with the implementation of a Marine Mammal Mitigation

Protocol ("MMMP") with a standard 500 m mitigation zone will ensure that the risk of auditory injury is negligible. This is secured through Condition 8 of the DMLs.

11.39 The Applicant's assessment showed that temporary auditory impairment could occur out to a maximum of 2.0 km and noise levels sufficient to cause TTS are likely to elicit a fleeing response in seals. They concluded that the range of effects will therefore be confined mainly within the Project Two marine mammal study area (Subzone 2 plus 4 km buffer). Based on the predicted ranges of noise impacts for single piling using hammer energies of 1,200 kJ up to 3,000 kJ, and on the site-specific density data, the average number of animals predicted to be affected by noise levels sufficient to elicit TTS/fleeing response ranged from 0.09 to 0.16 animals. Using the Sea Mammal Research Unit (SMRU) modelled at-sea density estimates the predicted effect was greater, ranging from 0.73 to 1.29 animals affected by TTS/fleeing. Using both the site-specific, or the SMRU data, only a small proportion (up to a maximum of 0.019%) of the Humber Estuary SAC population is predicted to be affected and a smaller proportion of the South East England Management Unit ("MU") grey seal population, with a maximum (for the largest hammer energy) 0.012% of this reference population experiencing TTS/fleeing at any one time.

11.40 For concurrent piling, the number of animals affected by noise levels sufficient to elicit the TTS/fleeing response, as calculated from the site-specific density data, was relatively small: a maximum of 0.21 animals affected by the largest hammer energy, accounting for 0.003% of the Humber Estuary SAC population or 0.002% of the South East England MU population. SMRU modelled at-sea densities provided a greater predicted effect with a maximum of 1.35 animals affected by TTS/fleeing, accounting for 0.019% of the Humber Estuary SAC population or 0.01% of the South East England MU population.

11.41 The Applicant's assessment showed that piling will result in a medium term disturbance to grey seals over a maximum duration of 1.32 years phased over a five year construction period. However, the zone of noise disturbance for grey seal does not extend as far as their haul-out locations, the closest of which (Donna Nook) lies over 100 km from the Project. Therefore, the Applicant stated that there will only be potential for behavioural displacement over a small area of their habitat. This has been estimated for grey seal as a maximum of approximately 12.57 km² for a single pile and 25.14 km² for concurrent piling. The Applicant stated that it is likely, therefore, that during pile driving grey seal would tend to avoid these areas of disturbance and move to other areas of suitable habitat. There may be some energetic costs of displacement (either from expending more energy whilst circumventing disturbed areas, or from possible reduced foraging due to density-dependent competition in other areas). However population-level effects due to the small area affected at any one time in comparison to the large extent of similar habitat available elsewhere would be very unlikely. Furthermore, the available data on the density of this species in areas affected by noise indicated that a limited number of grey seal would be affected by construction noise (both taking account of the South East England MU reference populations and the Humber Estuary SAC grey seal population).

11.42 Taking the information provided above together with the relatively small areas and number of animals affected by construction noise, significant disturbance and changes in the population and distribution of this species within European sites are not expected by the Applicant. Furthermore,

full recovery to baseline levels is predicted to occur and consequently no significant long term effects on grey seal populations are predicted by the Applicant as likely to occur.

11.43 The ExA Report notes that there are a number of proposed mitigation measures at all piling locations. These are shown below in table 22 and are secured in Condition 8.

Table 22: Marine Mammal mitigation measures adopted by the Project (taken from table 5.4 of the Applicant's HRA [APP-071]).

Mitigation measures adopted as part of the project	Justification
A 30 minute modelled soft-start will be used for all piling activities. Piling will commence at a maximum of 20% hammer energy with a reduced strike rate. Hammer energy will ramp up with a maximum increase up to full hammer energy. The strike rate will increase from every six seconds to every four seconds over the soft-start.	The soft-start will provide an audible cue to allow marine mammals to flee the area before piling at full hammer energy commences. The soft/slow-start will help to mitigate any potential PTS injury.
A Marine Mammal Mitigation Protocol (MMMP) approved by the MMO, will be implemented during construction. Marine Mammal Observers and Passive Acoustic Monitoring will be used to detect marine mammals within the mitigation zone. For piling starts during darkness or periods of poor visibility (e.g., fog or high wave height) acoustic deterrents may be employed 30 minutes prior to piling. The use of acoustic deterrents will only be employed in consultation and agreement with JNCC, following recommended guidelines.	The use of an approved MMMP will mitigate for the risk of physical or permanent auditory injury to marine mammals within a 500 m mitigation zone. The mitigation zone is determined based on the potential for instantaneous auditory injury based on an initial hammer strike at 600 kJ (soft-start hammer energy) or auditory injury from cumulative SEL as predicted by the subsea noise modelling assessment.
Codes of conduct for vessel operators including advice to operators to not deliberately approach marine mammals and to avoid abrupt changes in course or speed, should marine mammals approach the vessel to bow-ride.	To avoid the impacts of collision risk on, and potential injury to, marine mammals.
A Code of Construction Practice ("CoCP") will be developed and implemented to cover the construction phase and an appropriate PEMMP (Project Environmental Monitoring Plan) will be produced and followed to cover the operation and maintenance phase of Project Two. The latter will include planning for accidental spills, address all potential contaminant releases and include key emergency contact details (e.g., EA, NE and MCA).	Measures will be adopted to ensure that the potential for release of pollutants from construction, operation and decommissioning activities is minimised. In this manner, accidental release of potential contaminants from rigs and supply/service vessels will be strictly controlled, thus providing protection for marine life across all phases of the development.
The maximum working distance between the two installation vessels will be 20 km.	Setting limits on the distance between installation vessels will reduce the maximum area of ensonification from the concurrent installation of foundations.
Mitigation will be applied for construction of the section of the cable route corridor that lies within 4 nautical miles (7.4 km) of the Humber Estuary SAC and/or 30 nautical miles (55.6 km) of The Wash and North Norfolk Coast SAC. The CoCP will be developed in this regard incorporating best practice in line with latest JNCC guidance (JNCC, 2012), the detail of which will be established through consultation with statutory advisors.	The inshore section of the cable route corridor lies within the zone of potential risk for corkscrew injury as defined by JNCC (2012), and as such appropriate guidance will be followed.
Inter-array cables will be buried to a minimum of 1 m. Inter-array and platform inter-connector cables will be buried to a maximum of 3 m.	While burial of cables will not reduce the strength of EMF, it does increase the distance between cables and marine mammal receptors, thereby

Export cables will be buried to a maximum of 5 m although this is only expected to be required in a limited number of places; burial depth below stable seabed of 3 m, subject to a cable burial assessment, is anticipated for the majority of the cable route corridor. Where it is not possible to ensure that cables will remain buried, cable protection will be installed.	potentially reducing the effect on those receptors.

11.44 The Applicant concluded that significant impacts associated with construction noise (piling) are not anticipated to occur on the grey seal populations of the Humber Estuary SAC (and Ramsar) as a result of the project and there is therefore no indication of an adverse effect on the integrity of grey seal features of the Humber Estuary SAC (and Ramsar) as a result of the Project alone.

11.45 The projects included in the Applicant's in-combination assessment are offshore wind farms within the regional marine mammal study area. Projects considered are those which have the potential to have overlapping construction periods with that of this Project.

11.46 The Projects included in the in-combination assessment were those which considered grey seal as a potential receptor within their Environmental Statements. The projects considered were:

- Hornsea Project One;
- Triton Knoll;
- Race Bank;
- East Anglia One;
- East Anglia Three;
- Dogger Bank Creyke Beck A and B: and
- Dogger Bank Teesside A and B;

11.47 The in-combination spatial maximum adverse scenario is based on this project being constructed with concurrent piling using the maximum 3,000 kJ hammer energy. If this scenario occurred, actual piling would occur for 0.38 years and the two vessels would be on site for a total of 2.4 years phased over up to five years maximum. Where possible, the Applicant sourced information from offshore wind farm assessments to show the range of possible effects, whereby the spatial maximum adverse scenario may be due to either concurrent piling (more than one piling vessel) or piling using the largest hammer energy. Therefore generating the maximum spatial extent of noise impact over the regional marine mammal study area.

11.48 The temporal maximum adverse scenario is based on piling for this Project using 1,700 kJ hammer energy. If this scenario occurred, actual piling would occur for a maximum of 1.32 years over up to five years maximum. Piling at other projects may partially overlap with the start or the end of the construction window of this Project, extending the total potential time that piling may occur in the regional marine mammal study area to more than the five years estimated for this Project alone. The Applicant considers this to be precautionary since the duration of piling events is likely to be shorter, in most cases, and simultaneous piling operations (between and within wind farm sites) will also result in a reduction in the total piling duration.

11.49 The construction phase for the projects that consider grey seal as a receptor extends between 2013 and 2028 (maximum duration of construction 16 years). For these projects there is a period of five years (last quarter of 2017 to third quarter of 2022) where the construction phases for projects

overlap with the construction phase of this Project, meaning that at some point during this time there may be several piling vessels operating concurrently.

11.50 The Applicant's HRA [APP-071] document set out the ES findings on grey seals from the Projects considered in-combination.

11.51 As noted above the Applicant identified that grey seal populations of the European sites may be subject to in-combination disturbance as a result of other projects during a period which may last up to 16 years. This could lead to an overall reduction in available habitat during this period, with potential consequences on fitness of individuals and energetic costs if animals have to swim longer distances to avoid areas of disturbance. The Applicant noted that grey seal may however be tolerant of loud noises during certain activities, such as foraging, with empirical evidence of the effect of offshore wind farm construction on seals having found animals foraging at their preferred habitat during construction.

11.52 The Applicant also noted that the in-combination area of disturbance would be very small in comparison to the extent of available habitat elsewhere and that it is unlikely that seals will be displaced from all projects at any one time, suggesting that individuals will be able to continue foraging. The Applicant noted that disturbance will be limited to the periods of active piling, rather than the whole construction periods and recovery is anticipated following cessation of piling. Any disturbance will therefore be intermittent and recovery to baseline levels is anticipated in the long term.

11.53 The Applicant concluded that significant impacts associated with construction noise (piling) are not anticipated to occur on the grey seal populations of the Humber Estuary SAC (Ramsar), as a result of the Project in-combination with other plans or projects.

11.54 At the Relevant Representations stage NE raised a number of issues regarding potential impacts to marine mammals [RR-021]. These included noise from construction, cumulative impacts, impacts of vessel disturbance and entanglement with anchored monopiles.

11.55 NE stated in their summary of written representations [REP1-038] that they are satisfied that all of the issues raised in their Relevant Representation have been satisfactorily addressed by the Applicant during SoCG discussions. This is on the basis that the Marine Mammal Mitigation Protocol (MMMP), as secured within Condition 8 of the DMLs, is updated to ensure that, where appropriate, consideration is given to the use of noise reduction at source technologies.

11.56 The Wildlife Trusts ("TWT") in their Relevant Representation requested that more explicit mitigation for impacts on grey seals should be specified in the outline CoCP in order to ensure disturbance to the grey seal feature of the Humber Estuary SAC is minimised [RR-029].

11.57 The ExA asked NE a question in relation to the concerns raised by TWT. NE [REP1-040] stated that as construction works in the intertidal will be limited to April and September (as secured in Condition 18(3) of the deemed Marine Licences A2 and B2), this will avoid the main pupping season (October-December). In addition the area used by the breeding grey seal population of the Humber Estuary SAC is located within an active bombing range; therefore some acclimation to loud noises should be expected. In the SoCG between the Applicant and NE [REP5-026], the Applicant has agreed to adopt best-practice measures and codes of conduct when in close proximity to seal haul-out sites. Condition 8 of both the Transmission and Generation Assets DMLs requires the

approval of a CoCP and this would serve to minimise risks from collision with shipping during construction. NE confirmed their advice that there is no likely significant effect, alone and in-combination on the grey seal feature of the Humber Estuary SAC.

11.58 The SoCG between the Applicant and TWT [REP1-092] suggests that TWT had agreed with the Applicant and this was no longer an outstanding issue.

11.59 The ExA agrees with NE's conclusions, that on the basis of objective scientific evidence, adverse integrity effects can be discounted for the project alone. The ExA has reached the same conclusion with regard to in-combination effects, but wished to highlight that, given that Dong Energy are now in ownership for both Hornsea Project 1 and Hornsea Project 2, any opportunities for sharing work in the intertidal area would hopefully be taken to minimise intertidal impacts on coastal habitats and species.

11.60 **The Secretary of State agrees with the views of the Applicant, NE and the ExA that due to Requirements/Conditions incorporated in the DCO/DMLs there will not be an adverse effect on integrity on the grey seal feature of the Humber Estuary SAC and Ramsar, either alone or in-combination with other plans or projects**

Overall Conclusion for the Humber Estuary SAC and Ramsar

11.61 **The Secretary of State agrees with the views of the Applicant, NE and the ExA that due to Requirements/Conditions incorporated in the DCO/DMLs there will not be an adverse effect on integrity on any feature of the Humber Estuary SAC and Ramsar, either alone or in-combination with other plans or projects.**

Berwickshire and North Northumberland Coast SAC

12.1 The site covers an extensive and diverse stretch of coastline in north-east England and south-east Scotland. There is variation in the distribution of features of interest along the coast. The only feature of the site identified by the Applicant as potentially affected by the Project is grey seal which is an Annex II feature of the site and was a primary reason for site selection.

12.2 The north-east England coastal section of the SAC is representative of grey seal *Halichoerus grypus* breeding colonies in the south-east of its breeding range in the UK. It is the most south-easterly site selected for this species, and supports around 2.5% of annual UK pup production. Within the SAC there are two major grey seal breeding groups: one inhabiting the Farne Islands and one on the mainland coast at Fast Castle. Additionally, there are also several breeding sites in the immediate vicinity of the SAC (Thompson and Duck, 2010).

12.3 Out with the breeding season, grey seal haul out on the shore regularly to rest. There are several sites located along the eastern coast of the UK, including some within the Berwickshire and North Northumberland Coast on the Farne Islands, Coquet Island, and at Lindisfarne. There are no other haul-out sites on the eastern UK coast between Coquet Island and the Humber Estuary, and as such the Berwickshire and North Northumberland Coast SAC is regarded as an important haul-out area for grey seal (Thompson and Duck, 2010).

12.4 The conservation objectives for the Berwickshire and North Northumberland Coast SAC can be seen below in table 23. The Conservation Objectives have been used to inform this Habitats Regulations Assessment.

Table 23: Conservation Objectives for the Berwickshire and North Northumberland Coast SAC (Natural England 2016)

Conservation Objectives for the Berwickshire and North Northumberl and Coast SAC	*With regard to the natural habitats and/or species for which the site has been designated, and subject to natural change;* *Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:* • *The extent and distribution of qualifying natural habitats and habitats of qualifying species* • *The structure and function (including typical species) of qualifying natural habitats* • *The structure and function of the habitats of qualifying species* • *The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely* • *The populations of qualifying species, and,* • *The distribution of qualifying species within the site.*

12.5 The Applicant's HRA [APP-071] notes that overall the global assessment of the value of the Berwickshire and North Northumberland Coast SAC for the conservation of grey seal is good.

12.6 The Applicant identified that the primary source of underwater noise that may impact marine mammals during construction is that arising from pile driving activities during foundation installation [APP-071]. The Applicant noted that there are a number of factors which affect the response of

marine mammals to sounds in their environment as noted in paragraph 11.36 above. The potential effects of piling noise on marine mammals can be categorised in three ways as discussed above in paragraph 11.37.

12.7 The Applicant investigated the potential effects of noise disturbance on grey seals. It reported that the effects of instantaneous injury/PTS are expected to be highly localised with effects only occurring out to a maximum of less than 500 m from the source for instantaneous injury/PTS. Assuming grey seal respond to the onset of pile driving by swimming away from the noise source, the potential for the onset of auditory injury would be expected to be mitigated by soft-start piling. This together with the implementation of a Marine Mammal Mitigation Protocol ("MMMP") with a standard 500 m mitigation zone will ensure that the risk of auditory injury is negligible.

12.8 The Applicant's assessment showed that piling will result in a medium term disturbance to grey seals over a maximum duration of 1.32 years phased over a five year construction period. However, the zone of noise disturbance for grey seal does not extend as far as their haul-out locations, the closest of which (Donna Nook) lies over 100 km from the Project. Therefore, the Applicant stated that there will be potential for behavioural displacement over only a small area of their habitat. This has been estimated for grey seal as a maximum of approximately 12.57 km² for a single pile and 25.14 km² for concurrent piling. The Applicant stated that it is likely, therefore, that during pile driving grey seal would tend to avoid these areas of disturbance and move to other areas of suitable habitat. There may be some energetic costs of displacement (either from expending more energy whilst circumventing disturbed areas, or from possible reduced foraging due to density-dependent competition in other areas). However population-level effects due to the small area affected at any one time in comparison to the large extent of similar habitat available elsewhere would be very unlikely. Furthermore, the available data on the density of this species in areas affected by noise indicated that a limited number of grey seal would be affected by construction noise.

12.9 Taking the information provided alongside the relatively small areas and number of animals affected by construction noise, significant disturbance and changes in the population and distribution of this species within European sites are not expected by the Applicant. Furthermore, full recovery to baseline levels is predicted to occur.

12.10 The ExA Report notes that there are a number of proposed mitigation measures at all piling locations. These are shown above in table 22 as taken from table 5.4 of the Applicant's HRA [APP-071]. These are secured in Condition 8 of each DML.

12.11 The Applicant concluded that significant impacts associated with construction noise (piling) are not anticipated to occur on the grey seal populations of the Berwickshire and North Northumberland Coast SAC as a result of the project and there is therefore no indication of an adverse effect on the integrity of grey seal features of the site as a result of the Project alone.

12.12 The Applicant's HRA [APP-071] assessed the effects on the Berwickshire and North Northumberland Coast SAC both alone and in-combination. The in-combination assessment on grey seal carried out by the Applicant is discussed in detail in paragraphs 11.45-11.53 above.

12.13 The Applicant concluded that significant impacts associated with construction noise (piling) are not anticipated to occur on the grey seal populations of the Berwickshire and North Northumberland Coast SAC, as a result of the Project alone and in-combination with other plans or project.

12.14 The RIES records that no comments were received during the examination from relevant SNCBs or other interested parties in relation to grey seal at the Berwickshire and North Northumberland Coast SAC.

12.15 The ExA concluded that there would be no adverse effects on site integrity on this European site.

12.16 **The Secretary of State agrees with both the views of the Applicant and the recommendation of the ExA that due to Requirements incorporated in the DCO there will not be an adverse effect on integrity on the grey seal feature of the Berwickshire and North Northumberland Coast SAC, either alone or in-combination with other plans or projects.**

River Derwent SAC

13.0 The River Derwent SAC represents one of the best British examples of the classic river profile, with its source in the high-energy upland valleys of the North York Moors whose energy dissipates as the channel becomes wider and deeper as it passes through the flat and wide lowland floodplain valleys to its confluence with the Ouse and out into the Humber Estuary. Only the lower reaches of the river are designated as a SAC (Natural England 2016).

13.1 The River supports an aquatic flora unusual in northern Britain. The River Derwent is also noted for the rich diversity of its native fish communities, which include the Annex II species river lamprey *Lampetra fluviatilis* and sea lamprey *Petromyzon marinus* populations that spawn in the lower reaches. The lower reaches of the River Derwent SAC provide the clean stable gravels needed for spawning and the stable silts with low flow and organic detritus for nursery habitat required by sea lamprey. The lower reaches of the Derwent provide suitable areas of gravels, silt or sand for spawning of river lamprey.

13.2 River lamprey are an Annex II species which are a primary reason for selection of the site as a SAC, sea lamprey are an Annex II species which are present as a qualifying species of the site but not a primary reason for site selection (JNCC 2016).

13.3 The conservation objectives for the River Derwent SAC can be seen below in table 24. The Conservation Objectives and the supporting Supplementary Advice have been used together to inform this Habitats Regulations Assessments.

Table 24: Conservation Objectives for the River Derwent SAC (Natural England 2014)

Conservation Objectives for the River Derwent SAC	*Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;* • *The extent and distribution of qualifying natural habitats and habitats of qualifying species* • *The structure and function (including typical species) of qualifying natural habitats* • *The structure and function of the habitats of qualifying species* • *The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely* • *The populations of qualifying species, and,* • *The distribution of qualifying species within the site.*

13.4 The Applicant's HRA [APP-071] noted that in the case of the River Derwent SAC, given its location in relation to the project, there is no potential impact pathway between the Project and the habitat features of the site. The Applicant considered that the key conservation objectives of the site which needed consideration in relation to potential impacts on migratory fish are those associated with the qualifying species themselves rather than their habitats.

13.5 The areas of potential likely significant effects identified for river and sea lamprey of the River Derwent SAC were associated with increased suspended sediment concentrations and deposition during construction and electro-magnetic field ("EMF") related effects during

operation and maintenance of the Project, potentially affecting the lamprey during their migration.

13.6 The Applicant noted that sea lamprey and river lamprey may be found in coastal and/or estuarine areas either in transit from and into home rivers and/or engaged in foraging activity [APP-071]. As such, the greatest potential for interaction between the Project and the River Derwent SAC is anticipated to mainly occur in the areas relevant to the subtidal and intertidal section of the export cable.

13.7 The Applicant's HRA [APP-071] document noted that whilst river and sea lamprey are expected to transit the Humber Estuary and adjacent coastal areas as part of their normal migration and foraging activity, taking the short lived and small scale of the increased suspended sediment concentrations and therefore low magnitude of the potential effect, impacts in terms of significant disturbance, effects to the population level and/or changes in the distribution of river and sea lamprey within the sites are not to be expected. As such, significant impacts are not anticipated on the river and sea lamprey populations of the River Derwent SAC as a result of the Project.

13.8 The Applicant noted that the background levels of suspended sediment concentrations in the Humber Estuary are naturally high (i.e., up to 260 mg/l) and therefore the river and sea lamprey populations of the European sites will be habituated to migrate through areas where high levels of suspended sediment may be present. Furthermore, given the small spatial extent of expected sediment plume, particularly in the Humber Estuary area, there would be sufficient alternative undisturbed areas available for these species to be used for migration in and out of the estuary and/or for feeding.

13.9 In relation to in-combination impacts the Applicant's HRA [APP-071] notes that other plans and projects in the Humber Estuary area are not anticipated to have potential to result in in-combination impacts in relation to increased suspended sediment concentrations and sediment deposition. The Applicant's assessment concluded that the potential for the interaction of the sediment plumes arising from both the Project and other activities considered in-combination is considered to be low. Should interaction occur (e.g., where concurrent activity occurs in very close proximity) the result is predicted to be a short term, localised increase in suspended sediment concentration (up to 5 mg/l) over that which would otherwise be expected from either activity alone. As noted above river and sea lamprey will be habituated to migrate through areas where high levels of suspended sediment may be present.

13.10 The transport of electricity through subsea power cables has the potential to emit a localised EMF which could potentially affect the sensory mechanisms of some species of fish and shellfish. The key concern in relation to EMFs and migratory fish species such as river and sea lamprey is the potential for EMF to interfere with their navigation. The Applicant noted that impacts associated with EMFs would be highly localised being limited to the immediate vicinity of the cables. In addition the export cables would be buried to a minimum target depth of 2m in the intertidal area. The Applicant stated that potential impacts are expected to be short term, potentially resulting in temporary behavioural effects rather than causing a barrier to migration. Consequently impacts in relation to long term significant disturbance, effects to the population

level and/or changes in the distribution of river and sea lamprey within the sites are not to be expected either as a result of the project alone or in-combination with other plans or projects.

13.11 As a result significant impacts are not anticipated by the Applicant on the river and sea lamprey populations of the River Derwent SAC either alone or in-combination with other plans or projects due to either increased suspended sediment concentrations and deposition during construction or EMF related effects during operation and maintenance.

13.12 The ExA report notes that for the River Derwent SAC the Applicant concluded there was no adverse effect on integrity. The ExA report notes that no Interested Parties raised any issues about this conclusion.

13.13 The Secretary of State concludes that there will not be an adverse effect on integrity on the river and sea lamprey features of the River Derwent SAC, either alone or in-combination with other plans or projects.

The Wash and North Norfolk Coast SAC

14.1 The Wash is the largest embayment in the UK. It is connected via sediment transfer systems to the north Norfolk coast. Together, the Wash and North Norfolk Coast form one of the most important marine areas in the UK and European North Sea coast (Natural England, 2014).

14.2 The only feature of the site identified by the Applicant as potentially affected by the Project is harbour seal which is an Annex II feature of the site and was a primary reason for site selection.

14.3 The Wash and North Norfolk Coast SAC holds approximately 7% of the UK population of harbour seal, making it the largest colony in the UK. Ninety percent of the English population of harbour seal inhabit this site. Most of the seals in this SAC are present at The Wash haul-out site (English Nature and Environment Agency, 2003).

14.4 The Applicant's HRA [APP-071] notes that a total of 3,086 seals were counted at The Wash between 2007 and 2010. The extensive intertidal flats of The Wash and North Norfolk Coast SAC provide ideal conditions for breeding and hauling out by harbour seal. Pupping and lactation occurs between June and July, with birth sites tending to be located near the top of the bank. Following weaning and breeding, harbour seal haul-out on the intertidal flats to begin their annual moult which can last until September. The Applicant noted that intertidal mudflats and sandflats also provide an important habitat for seal throughout the year as they spend up to 50% of their time hauled out.

14.5 The Applicant's HRA highlights that the overall global assessment of the value of The Wash and North Norfolk Coast SAC for the conservation of harbour seal is excellent.

14.6 The conservation objectives for The Wash and North Norfolk Coast are below in table 25. The Conservation Objectives have been used to inform this HRA.

Table 25: Conservation Objectives for the Wash and North Norfolk Coast SAC (Natural England 2016)

Conservation Objectives for the Wash and North Norfolk Coast SAC	*With regard to the natural habitats and/or species for which the site has been designated, and subject to natural change;* *Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:* • *The extent and distribution of qualifying natural habitats and habitats of qualifying species* • *The structure and function (including typical species) of qualifying natural habitats* • *The structure and function of the habitats of qualifying species* • *The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely* • *The populations of qualifying species, and,* • *The distribution of qualifying species within the site.*

14.7 The primary source of underwater noise that may impact marine mammals during construction is that arising from pile driving activities during foundation installation. The Applicant's HRA [APP-071] notes that there are a number of factors which affect the response of marine mammals to

sounds in their environment as noted in paragraph 11.36 above. The potential effects of piling noise on marine mammals can be categorised in three ways as discussed above in paragraph 11.37.

14.8 The Applicant investigated the potential effects of noise disturbance on harbour seals.

14.9 The Applicant's HRA [APP-071] reported that the effects of instantaneous injury/PTS are expected to be highly localised with effects only occurring out to a maximum of less than 500 m from the source for instantaneous injury/PTS. Assuming harbour seal respond to the onset of pile driving by swimming away from the noise source, the potential for the onset of auditory injury would be expected to be mitigated by soft-start piling. This together with the implementation of a Marine Mammal Mitigation Protocol ("MMMP") with a standard 500 m mitigation zone will ensure that the risk of auditory injury is negligible. These are secured in Condition 8 of each DML.

14.10 The Applicant's HRA [APP-071] showed that temporary auditory impairment could occur out to a maximum of 2.0 km and noise levels sufficient to cause TTS are likely to elicit a fleeing response in seals. The Applicant therefore stated that a range of effects will be confined mainly within the Project's marine mammal study area.

14.11 The Applicant's method of assessment of spatial maximum adverse scenario and temporal maximum adverse scenario for all seal species are discussed above in paragraph 11.47.

14.12 The Applicant's HRA [APP-071] showed that under the spatial maximum adverse scenario the number of animals affected by noise level sufficient to elicit the TTS/fleeing response, as calculated from the site-specific density data, was relatively small, with a maximum of 0.46 animals affected by the largest hammer energy, accounting for 0.013% of the South-east England MU population. SMRU modelled at-sea densities provided a greater predicted effect with a maximum of 0.80 animals affected by TTS/fleeing, accounting for 0.023% of the South East England MU population.

14.13 For the temporal maximum adverse scenario the number of animals potentially affected for possible avoidance based on the higher values for the SMRU at-sea density data would be 0.44 individuals (0.012% of the MU reference population) for single piling. Site-specific data predicts lower numbers affected with 0.23 animals affected on any one day during piling, accounting for 0.006% of the MU reference population.

14.14 The Applicant concluded that piling will result in a medium term disturbance to harbour seals over an accumulated duration of up to 1.32 years phased over a five year construction piling period. The main harbour seal haul-out in The Wash lies approximately 90.5 km from the Project. The Applicant therefore considered it unlikely that individuals hauled-out will be disturbed or displaced during piling operations. They considered that the most likely effect will be displacement from a small area of their habitat at sea, which has been estimated for seals as a maximum of approximately 12.57 km² for a single pile and 25.14 km² for concurrent piling. As described for grey seal, there may be energetic costs of displacement due to increased swimming distances if seals have to deviate from their course around the zone of disturbance, or reduced foraging due to density-dependant competition in alternative foraging areas. However, due to the very small extent of habitat affected compared to the availability of similar suitable habitat in the wider area, the Applicant considered population-level effects unlikely.

14.15 In addition to the information highlighted above the Applicant noted that empirical studies on TTS in seals have concluded that even within the range of audibility, harbour seal may continue to

forage. Furthermore, evidence from a recent population modelling study for the effects of piling at the Moray Firth and Beatrice proposed offshore wind farms on harbour seal (Thompson *et al* ., 2011) indicated that where effects do occur these are likely to be reversible following the end of the piling activity. The results of the study showed that over a 25-year period, even with considerable reductions in the population during the piling phase, for all worst case spatial and temporal scenarios, and for cumulative effects from both wind farms piling concurrently, the population of harbour seals would recover in the long-term.

14.16 As a result of the information detailed above the Applicant concluded that significant impacts associated with construction noise (piling) are not anticipated to occur on the harbour seal populations of the Wash and North Norfolk Coast SAC.

14.17 The Applicant also carried out an in-combination assessment to determine the impacts on harbour seals.

14.18 The Projects included in the in-combination assessment were those which considered harbour seal as a potential receptor within their Environmental Statements. The projects considered were:

- Hornsea Project One
- Triton Knoll
- East Anglia One
- Race Bank
- East Anglia Three

14.19 The in-combination spatial maximum adverse scenario is based on this project being constructed with concurrent piling using the maximum 3,000 kJ hammer energy. If this scenario occurred, actual piling would occur for 0.38 years and the two vessels would be on site for a total of 2.4 years phased over up to five years maximum. Where possible, the Applicant sourced information from offshore wind farm assessments to show the range of possible effects, whereby the spatial maximum adverse scenario may be due to either concurrent piling (more than one piling vessel) or piling using the largest hammer energy, therefore generating the maximum spatial extent of noise impact over the regional marine mammal study area.

14.20 The construction phase for the projects that consider harbour seal as a receptor extends between 2013 and 2028 (maximum duration of construction 16 years). For these projects there is a period of five years (last quarter of 2017 to third quarter of 2022) where the construction phases for projects overlap with the construction phase of this Project, meaning that at some point during this time there may be several piling vessels operating concurrently.

14.21 The Applicant's assessment stated that disturbance as a result of piling noise from these projects could lead to potential consequences on fitness of individuals. The Applicant noted that the potential in-combination areas of disturbance would be small in comparison to the extent of available habitat elsewhere. It was noted that it is unlikely that seals will be displaced from all projects at any one time, suggesting that individuals will be able to continue foraging.

14.22 The Applicant noted that disturbance will be limited to the periods of active piling, rather than the whole construction periods and recovery is anticipated following cessation of piling. Any disturbance will therefore be intermittent and recovery to baseline levels is anticipated in the long

term. Significant disturbance to the species and changes in the population and distribution of this species within European sites are therefore not to be expected in the long term.

14.23 The Applicant concluded that significant impacts associated with construction noise (piling) are not anticipated to occur on the harbour seal populations of the Wash and North Norfolk Coast SAC, as a result of the Project in-combination with other plans or projects.

14.24 The ExA report and RIES state that no Interested Parties raised any issues relating to the conclusions of the Applicant of no adverse effect on integrity of the harbour seal feature and of the Wash and North Norfolk Coast SAC.

14.25 The ExA concluded that there would be no adverse effects on site integrity on this European site.

14.26 **The Secretary of State agrees with the views of both the Applicant and the ExA that there will not be an adverse effect on integrity on the harbour seal feature of the Wash and North Norfolk Coast SAC, either alone or in-combination with other plans or projects.**

Southern North Sea pSAC

15.1. As stated above the ExA report notes that during the Examination a suite of sites across UK waters were under consideration by JNCC as possible SACs (pSACs) specifically for harbour porpoise. The ExA report notes that no date for consultation on these had been fixed, though NE stated that it was likely to start in January 2016. These sites include the Southern North Sea draft SAC. NE advised that once formal consultation starts, the impacts on the proposed designated features would become a material consideration with regards to the HRA for the Project.

15.2. The ExA report noted that in considering the application for the NSIP Dogger Bank Teesside A and B Wind Farm (hereafter referred to as Teesside A and B), the Secretary of State's HRA noted that the suite of harbour porpoise dSACs was:

"…still at the early stages of consideration for possible future designation with approvals and formal consultation to follow. The SoS has decided to consider this in this HRA as she does not wish to take a decision on the Project without first satisfying herself that it would not damage the possibility of future cSAC designation".

15.3. Against this background, and in the absence of information on the suite of possible SACs for harbour porpoise, the ExA suggested that this approach of undertaking a shadow HRA in relation to the Southern North Sea dSAC would be relevant for this Project. NE indicated that it was content with the proposed approach as a way to address the question in the absence of formal material on dSACs. As a consequence, the Applicant prepared an Addendum to its HRA following the approach undertaken by the Secretary of State for Teesside A and B.

15.4. The Applicant's Addendum HRA noted that at the time of drafting it was not possible to present figures depicting the location or the anticipated location of the dSAC. Nor were there any defined conservation objectives or any agreed specific conditions for Favourable Conservation Status ("FCS").

15.5. The Applicant's HRA screening report [APP-0174] states that the possibility of LSE for the harbour porpoise population of the North Sea relates to the potential for behavioural disturbance associated with underwater noise arising from piling activity during construction only. The Applicant notes that this conclusion aligns with that of the Secretary of State's Appropriate Assessment for Teesside A and B [REP4-026].

15.6. The assessment of LSE by the Applicant was made at the North Sea population level (mirroring the Management Unit level approach taken by the Secretary of State in the Teesside A and B HRA). It is based on the worst case scenario and includes consideration of embedded project mitigation. As such, the assessment takes account of the potential for direct and indirect impact and the highly mobile nature of the species, together with the extent of the overall population Management Unit and the long-term focus behind points used to define FCS.

15.7. The Applicant's HRA report assessed adverse effect on integrity for marine mammals alone [APP-0171]. It considered the potential for underwater noise from piling activity during construction to lead to adverse effect on integrity to grey seal, harbour seal and harbour porpoise at designated sites across the North Sea. The sites considered did not include the Southern North Sea dSAC due

to the lack of available information at that time. The Applicant considered that the assessment carried out for harbour porpoise is relevant and applicable to the dSAC as:

- Harbour porpoise are a mobile population across the North Sea with the potential for individuals from each designated site considered to form part of the overall mobile population.
- The description of the potential for impact is based on the worst case scenario that remains unchanged.
- The assessment of potential impact follows a highly precautionary worst case approach, with the assessment of significance based on worst case effects.
- Although the Disturbance Effects on Harbour Porpoise population in the North Sea (DEPONS) study had yet to publish final results, the interim findings do not appear to contradict the conclusions of the Applicant's HRA.

15.8. The Applicant therefore suggested that the existing assessment of potential for adverse effect on integrity from the Project to harbour porpoise across the North Sea applies to the assessment being made for the Southern North Sea dSAC [REP4-026].

15.9. The key point discussed within the Applicant's original HRA in terms of impacts to harbour porpoise relates to the potential for Temporary Threshold Shift and the possibility that harbour porpoise will avoid a defined area [APP-0171]. The Applicant's assessment included consideration of the number of harbour porpoise that may be affected for the maximum duration of construction (a maximum of 1.32 years of piling activity, spread over a period of up to 5 years).The results estimate a worst case displacement (including likely and possible avoidance) of up to ~3.46% (individual piling) or 5% (concurrent piling) of the North Sea population. This displacement impact assumes a 100% response and is considered precautionary. In the Applicant's view a more realistic assessment, taking account of dose-response relationship, found the potential for displacement to be smaller (up to 1.68% for individual piling or 2.89% for concurrent piling of the North Sea population) [REP4-026].

15.10. The Applicant's HRA concluded that there would not be a potential for adverse effect on site integrity from the Project alone on the dSAC. This is as a result of a lack of long-term effects of the Project on the overall harbour porpoise population, the lack of any long-term change in natural range of harbour porpoise as a result of the Project, and lack of any significant effect on the availability of habitat for harbour porpoise.

15.11. In terms of in-combination impacts the original HRA identified that piling noise during construction is the only impact relevant. The Applicant carried out an in-combination assessment and demonstrated that with projects likely to act in-combination with the Project the maximum area of the Southern North Sea anticipated to be affected in-combination at any one time is a maximum of 8.84%. The Applicant therefore concluded that there would be no adverse effect on the integrity of the harbour porpoise population across the North Sea resulting from this Project in-combination with other plans or projects [REP4-026].

15.12. A number of Interested Parties provided representations in relation to harbour porpoise. The Wildlife Trusts ("TWT") considered that in relation to the dSAC the Addendum HRA is not adequate to be able to conclude no adverse effect on integrity [REP5-038]. They considered that it is

incorrect to assess the effect on site integrity by assessing the impact against the whole North Sea population. In addition they considered that there is enough doubt and uncertainty as to what the population consequences of disturbance resulting from pile driving are with no guaranteed mitigation at source that, at either site or population level, it would not be possible to conclude no adverse effect on site integrity. Whale and Dolphin Conservation ("WDC") expressed agreement with TWTs position [REP7-038].

15.13. NE commented that in the absence of conservation objectives and site documentation on specific harbour porpoise dSACs it is not possible to undertake a robust HRA and therefore conclude on site integrity. They noted that as it was not possible to conduct a robust HRA at the site level it is impossible to assess site integrity at any scale other than at the MU level. NE stated that if possible sites for harbour porpoise are consulted upon, an updated HRA would be needed which considers the conservation objectives and impacts at a site level [REP7-034].

15.14. The ExA report notes that in that absence of documentation regarding conservation objectives or defined limits for a Southern North Sea dSAC for harbour porpoise it was not possible during the Examination to carry out a robust HRA and provide a conclusion on site integrity. The ExA concluded that the Applicant had done as much as could reasonably be expected in terms of producing a shadow HRA for the dSAC. The ExA noted that although the Applicant concluded that there would likely be no adverse effect on site integrity of the Southern North Sea dSAC there has been challenge to this conclusion by both TWT and WDC.

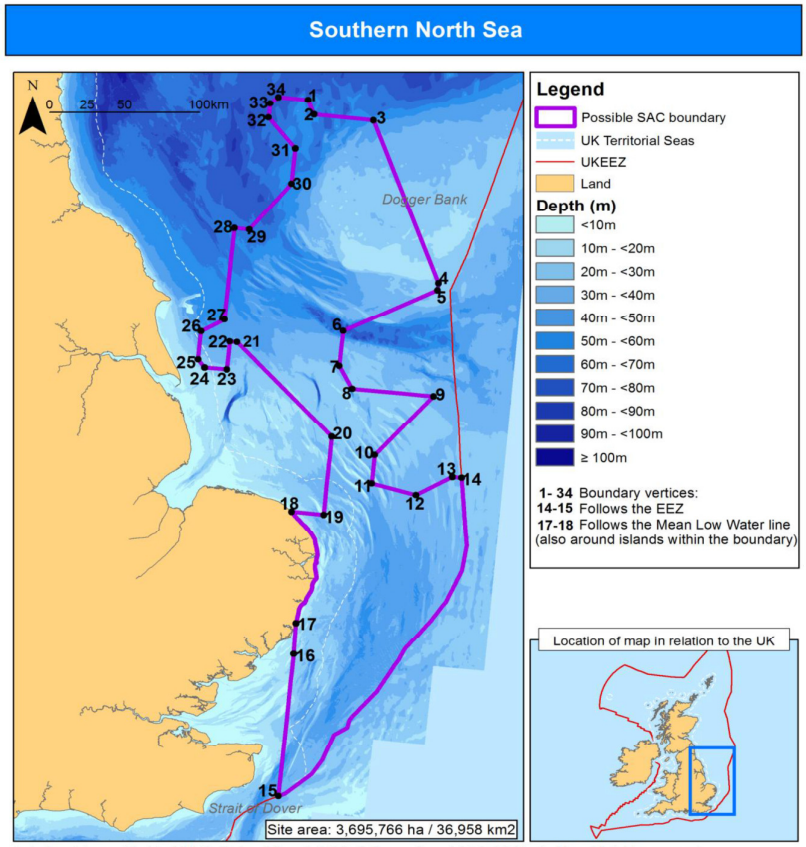
15.15. The ExA concluded that the Secretary of State will likely wish to instigate a specific HRA to inform whether Appropriate Assessment in relation to dSACs for harbour porpoise is necessary.

15.16. The Secretary of State notes that since the close of the examination of the Project, Government has launched the consultation into possible Special Areas of Conservation (pSAC) for Harbour Porpoise: this includes the Southern North Sea pSAC[45]. The consultation ran between 19th January 2016 and 3rd May 2016. The Secretary of State will therefore consider the Southern North Sea pSAC as a material consideration. The Project is partially located within the Southern North Sea pSAC.

15.17. The Southern North Sea pSAC is proposed for designation for the Annex II species harbour porpoise (*Phocoena phocoena*). The site includes parts of both territorial waters (out to 12 nautical miles from the baseline) and offshore waters (from 12 nautical miles from the coast out to 200 nautical miles or to the UK Continental Shelf limit). A map of the Southern North Sea pSAC can be seen below in figure 5.

[45] http://jncc.defra.gov.uk/SACconsultation

Figure 5: Map of Southern North Sea pSAC (from JNCC and NE SAC Selection Assessment Document).



ID	Latitude	Longitude	ID	Latitude	Longitude	ID	Latitude	Longitude	ID	Latitude	Longitude
1	55° 28' 53.1'' N	01° 02' 24.8'' E	10	53° 17' 32.9'' N	02° 11' 31.6'' E	19	52° 53' 06.4'' N	01° 45' 21.9'' E	28	54° 37' 0.5'' N	00° 27' 44.8'' E
2	55° 23' 34.2'' N	01° 07' 24.8'' E	11	53° 06' 45.7'' N	02° 11' 43.8'' E	20	53° 22' 42.4'' N	01° 44' 22.2'' E	29	54° 37' 11.8'' N	00° 37' 01.8'' E
3	55° 24' 03.2'' N	01° 45' 17.6'' E	12	53° 04' 11.8'' N	02° 38' 38.6'' E	21	53° 54' 05.6'' N	00° 39' 29.7'' E	30	54° 56' 28.6'' N	00° 59' 18.7'' E
4	54° 25' 05.4'' N	02° 37' 56.9'' E	13	53° 12' 19.1'' N	02° 59' 22.3'' E	22	53° 54' 0.3'' N	00° 35' 04.2'' E	31	55° 09' 56.9'' N	00° 58' 38.1'' E
5	54° 22' 23.6'' N	02° 37' 58.3'' E	14	53° 12' 19.0'' N	03° 04' 57.1'' E	23	53° 43' 17.2'' N	00° 35' 41.1'' E	32	55° 20' 23.2'' N	00° 39' 10.7'' E
6	54° 03' 07.5'' N	01° 43' 06.7'' E	15	51° 04' 38.9'' N	01° 39' 44.1'' E	24	53° 42' 60.0'' N	00° 22' 03.6'' E	33	55° 25' 46.4'' N	00° 38' 51.5'' E
7	53° 49' 40.4'' N	01° 43' 32.5'' E	16	51° 59' 04.9'' N	01° 38' 08.0'' E	25	53° 45' 35.5'' N	00° 17' 20.7'' E	34	55° 28' 33.4'' N	00° 43' 26.4'' E
8	53° 41' 38.9'' N	01° 52' 54.2'' E	17	52° 10' 54.3'' N	01° 37' 11.0'' E	26	53° 56' 22.0'' N	00° 16' 38.8'' E			
9	53° 41' 57.7'' N	02° 42' 50.7'' E	18	52° 52' 51.4'' N	01° 26' 06.8'' E	27	54° 02' 03.1'' N	00° 30' 01.3'' E			

15.18. The Southern North Sea site is located in the North Sea MU and has been recognised as an area with predicted persistent high densities of harbour porpoise. Approximately two thirds of the site, the northern part, is recognised as important for porpoises during the summer season, whilst the southern part is more important during the winter (JNCC, NE SAC Selection document).

15.19. The Southern North Sea site is very large and covers an area of 36,958km². The water depths within the site range between 10m and 75m, with the majority of the site shallower than 40m. The majority of the substrate types within the site are categorised as sublittoral sand and sublittoral coarse sediment.

15.20. The draft Conservation Objectives for the Southern North Sea pSAC can be seen below in table 26.

Table 26: Draft Conservation objectives for the Southern North Sea pSAC (*JNCC and NE Draft Conservation Objectives and Advice on Activities*).

Draft conservation Objectives for the Southern North Sea pSAC	***To avoid deterioration of the habitats of the harbour porpoise or significant disturbance to the harbour porpoise, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to maintaining Favourable Conservation Status (FCS) for the UK harbour porpoise.*** *To ensure for harbour porpoise that, subject to natural change, the following attributes are maintained or restored in the long term:* *1. The species is a viable component of the site.* *2. There is no significant disturbance of the species.* *3. The supporting habitats and processes relevant to harbour porpoises and their prey are maintained.*

15.21. The Inshore and Offshore Special Area of Conservation: Southern North Sea SAC Selection Assessment Document[46] written by NE and JNCC notes due to the large area of the Southern North Sea site, the population supported is substantial in the UK and European context. It is estimated that the site supports approximately 18,500 individuals (95% Confidence Interval: 11,867 - 28,899) for at least part of the year, as seasonal differences are likely to occur, and represents approximately 19% of the population within the UK part of the North Sea MU.

15.22. The document states that it should be noted that because this estimate is from a one-month survey in a single year it cannot be considered as a specific population number for the site. It is therefore not appropriate to use site population estimates in Habitats Regulations Assessments, as these need to take into consideration population estimates at the MU level, to account for daily and seasonal movements of the animals.

15.23. Following the close of the Examination the Secretary of State issued a consultation letter on the 29th March 2016. The purpose of this letter was to request joint advice from NE and JNCC on the latest conservation advice for the Southern North Sea pSAC to allow the Secretary of State to undertake a Habitats Regulations Assessment of the potential effects of the Project, both alone and in-combination with other plans and projects, on the harbour porpoise feature of the Southern North Sea pSAC.

15.24. NE and JNCC provided a joint response on the 1st April 2016[47]. The response noted that advice on the management of activities within the proposed site is currently being developed by the Statutory Nature Conservation Bodies, including NE and JNCC. The response stated that preliminary advice had been shared and discussed at meetings with Government, Regulators and Industry stakeholders. It was noted that this was a work in progress and consultation will continue. NE and JNCC's advice was therefore that the HRA for the Project should be undertaken using the draft Conservation Objectives provided in the pSAC consultation documents.

[46] http://jncc.defra.gov.uk/pdf/SouthernNorthSeaSelectionAssessmentDocument.pdf

[47] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-000911-20160401%20Hornsea%202%20DECC%20request%20for%20advice%20response%20letter_NE_JNCC.pdf

15.25. NE and JNCC also commented that with regards to the draft 'Conservation Objective 2: There is no significant disturbance of the species', their advice was that that the HRA should take into consideration the planned installation of all wind farms within the site as well as other activities with the potential to disturb porpoise, such as geophysical surveys utilised by windfarms and other industries. NE and JNCC noted that this had particular relevance due to the scale and number of activities planned to occur within the site in forthcoming years and the potential for cumulative effects on the harbour porpoise feature of the pSAC. NE and JNCC recommended that the assessment that DECC Oil and Gas are undertaking for their sector is used as a reference.

15.26. Following the response from NE and the JNCC the Secretary of State issued a second consultation on the 7th April 2016 which invited the Applicant to provide any additional information for the purposes of a Habitats Regulations Assessment on the likely effects of the Project, both alone and in-combination with other plans and projects, on the harbour porpoise feature of this site.

15.27. The Applicant provided a response to this consultation in the form of Appendix A[48]. Appendix A noted that information generated (during the pre-application and examination phases of the consenting process) by the Project to date had been prepared for a specific purpose and it was not, therefore, necessarily straightforward to apply that information directly to the specific questions posed by the Southern North Sea pSAC and its Conservation Objectives. The purpose of Appendix A was therefore, to provide an interpretation of the existing information in the context of the latest draft material and interim SNCB advice to assist the Secretary of State in undertaking an HRA. It was noted that the Applicant consulted with NE on the content of the note.

15.28. The Applicant's Appendix A notes that disturbance is a behavioural response to noise which may lead to harbour porpoise being displaced from the area affected. The immediate effect of disturbance (that is sufficient to result in avoidance behaviour) is the temporary loss of available habitat. The presence of persistently high harbour porpoise densities in the Southern North Sea pSAC are attributed to an assumed availability of good feeding opportunities. The proposed Conservation Objective therefore brings a requirement that any disturbance across the site is managed, to ensure that any disturbance will not lead to harbour porpoise being excluded from a significant portion of the site for a significant period of time.

15.29. The Applicant therefore considered the potential effect on the Southern North Sea pSAC as a function of availability of habitat over time, rather than a consideration of numbers of individuals impacted. The Applicant felt that the existing project literature contained within the Project's ES, HRA and HRA Addendum includes the information necessary to inform a HRA for the Southern North Sea pSAC.

15.30. Appendix A submitted by the Applicant noted a number of sources of potential disturbance from the Project on the harbour porpoise feature of the Southern North Sea pSAC (including geophysical surveys). They concluded that likely significant effect exists only in relation to disturbance from underwater noise associated with percussive piling activity during the construction phase- this conclusion was for both the Project alone and in-combination.

[48] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-000922-Dong%20-%20Hornsea%20Project%202.pdf

15.31. The Project assessment of underwater noise disturbance effects on harbour porpoise which was presented within the ES, original HRA and HRA Addendum considered a number of different scenarios required as a result of the Rochdale envelope approach to the project design. Consideration was given to maximum spatial effect (with the worst case driven by the largest foundation types within the consent envelope, namely monopiles) and also to maximum temporal effect (with the worst case driven by the maximum number of piling events, namely through the use of jacket foundations that require multiple small pin piles per leg). Appendix A referred to information in the ES and HRA Addendum which discussed "zones" in relation to effects on harbour porpoise from underwater noise; injurious zone (which encompasses the Permanent Threshold Shift (PTS) and Temporary Threshold Shift (TTS) zones) and behavioural response zone (where possible disturbance may occur).

15.32. The Applicant noted within Appendix A that an important point of note, with regard to the consideration of behavioural effects, is how individuals within the "behavioural response zone" will actually respond to noise stimuli. The Applicant noted that within the "behavioural response zone" a wide variety of behavioural reactions up to but not necessarily including avoidance will occur. The Applicant concluded that evidence suggests that avoidance by all individuals within this behavioural response zone is an unrealistic assumption.

15.33. Appendix A identified the best available information, and provided a view as to how it should be interpreted in relation to the pSAC. This view was based on the information provided by the SNCBs at industry workshops held on 9th February 2016 and 23rd March 2016 that interpretation of the Conservation Objectives (in relation to disturbance) is based on ensuring that a significant portion (20%) of the habitat is not unavailable for a significant period (6 years) of time.

15.34. Appendix A notes that in its characterisation of the effect from underwater noise on harbour porpoise, the ES presented a number of values (informed by underwater noise modelling) that relate to different effects on harbour porpoise. As noted above, the underwater noise modelling undertaken to inform the ES did not predict an extent of avoidance behaviour in response to underwater noise disturbance, rather it identifies a zone in which a behavioural response may be elicited (ranging from subtle changes in existing behaviour, through to avoidance of the area). The Applicant therefore considered that the most appropriate values to use within the HRA for the Southern North Sea pSAC, given the basis of the Conservation Objective for disturbance is linked to the 'availability of habitat', would be those that characterise actual avoidance behaviour (rather than those that elicit some form of behavioural response), the distinction between 'avoidance behaviour' and 'behavioural response' being the important point.

15.35. Whilst the Applicant's ES and HRA do identify a more likely number of animals that may be "displaced" (from the overall total that may exhibit some form of behavioural response), they do not define the distance from underwater noise source out to which this change in effect consequence is most likely to occur. Appendix A noted that the Applicant understands that current advice from the SNCBs is that it would be more appropriate in the context of undertaking HRA's for the pSAC to consider the distance out to which consistent displacement (or avoidance) is likely to occur. The JNCC's interim advice is that a precautionary extent out to which such behavioural response from piling may be expected is 26km from the noise source. It is noted that this range (26km) sits within

the ‘injurious’ and ‘behavioural response’ ranges presented within the Applicant’s ES. Whilst the Applicant considers this is potentially overestimating the level at which consistent avoidance effects may occur, it is recognised by the Applicant that in the absence of more definitive information, it is a reasonable assumption on which to distinguish between “available” and “un-available” habitat when considering the effect on the pSAC.

15.36. The level of avoidance overlap per piling operation (assuming a precautionary 26km radius from noise source) with the pSAC will vary depending on the location of the piling event within the Project array. The greatest level of overlap (with the pSAC) will occur for piles in the most western extent of the array, and the lowest level of overlap for piles in the eastern extent.

15.37. The maximum level of overlap (assuming a precautionary 26km radius from noise source) with the pSAC (based on an assumed pile location within the most south-westerly part of the Project array area) is 1,983km² (equating to 5.37% of the total Southern North Sea pSAC area and 7.34% of the summer component of the pSAC). The level of overlap with the pSAC for a pile in the most easterly part of the array would be 83km² (equating to 0.22% of the total Southern North Sea pSAC area and 0.31% of the summer component of the pSAC).

15.38. The above information is based on a sequential piling programme. Concurrent piling within the Project site is also a possibility. The ES identified that under this scenario the spatial limit between two piling vessels would be 20km. Appendix A notes that the worst case likely avoidance footprint from such a scenario is 2,889km², which equates to 7.82% of the Southern North Sea pSAC (or 10.69% of the summer pSAC component). As for the sequential piling scenario this represents the worst possible extent, with the range being from this level down to 105km² or 0.28% (0.39% summer component) over the course of the piling window. It is noted that the figures presented for the concurrent piling scenario will reduce if the distance between the two installation vessels is less than the 20km separation distance considered under the maximum worst case footprint.

15.39. The Applicant provided a number of figures within Appendix A showing: the Project alone maximum overlap with sequential piling (see figure 6 below), the Project alone maximum overlap with concurrent piling (see figure 7 below), the Project alone minimum overlap with sequential piling and the Project alone minimum overlap with concurrent piling.

Figure 6: Project alone maximum overlap (Sequential Piling) (from the Applicant's Appendix A consultation response of 21 April 2016).

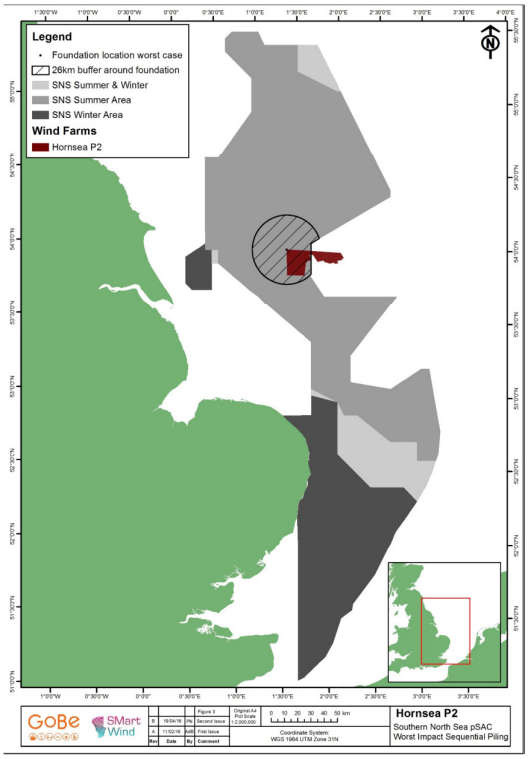
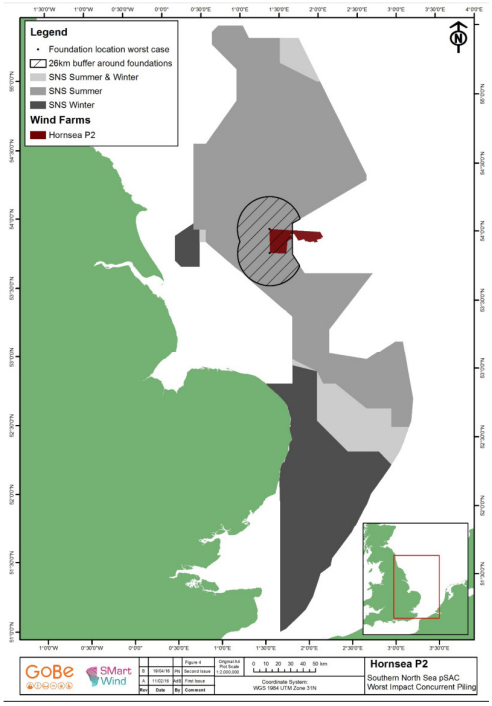


Figure 7: Project alone maximum overlap (Concurrent Piling) (from the Applicant's Appendix A consultation response of 21 April 2016).



15.40. The Applicant confirmed in Appendix A that the Project will not have any spatial interaction with the winter component of the Southern North Sea pSAC.

15.41. The maximum duration of effect is influenced by the number of piles, which in turn is influenced by the number and type of foundations. The temporal maximum adverse scenario, based on jacket foundations, predicted a maximum duration of piling of up to 1.32 years within a five-year construction window.

15.42. The Applicant's Appendix A concluded that as the effects from the Project alone are well within the thresholds (both spatial and temporal) put forward by JNCC as part of their interim advice (as discussed in paragraph 15.33), a conclusion of no adverse effect on integrity could be reached with a high degree of confidence for any design scenario within the existing consent envelope that may be brought forward by the Project.

15.43. With regard to in-combination impacts on the Southern North Sea pSAC, Appendix A notes that the list of projects within Table 2 of the Applicant's HRA Addendum should be refined to remove those projects that will not have an effect on the pSAC (due to distance and or lack of potential for construction timescale overlap). It is the Applicant's understanding that the only projects that have the potential to overlap with the pSAC and within the same calendar year as the Project (based on their publically available construction windows, i.e. the timescale within which piling activity may take place) are as follows:

- Triton Knoll;
- Galloper;
- Hornsea Project One;
- Dogger Bank Creyke Beck A & B;
- Dogger Bank Teesside A & B;
- East Anglia ONE; and
- East Anglia THREE.

15.44. Appendix A noted that the other offshore wind projects listed above that could potentially contribute in-combination are likely to affect a similarly small area of the pSAC – even on the basis of worst case assumptions. The Applicant concluded that it is entirely unrealistic to assume that all of the project's piling programmes will overlap and that even if there is some level of overlap between projects, it is wholly unrealistic to assume that they will all contribute to the extent of their respective worst case parameters. The Applicant noted that even on the basis of worst case assumptions a number of projects can come forward at the same time (and without further mitigation) without the risk of an adverse effect on the integrity of the pSAC, especially when considering the fact that for the majority of projects there will be a range in the extent of effect across their piling sequence as not all of the effect will occur in the pSAC area.

15.45. A footnote in Appendix A notes that the maximum overlap with the pSAC boundary from each of the projects listed above (based on a 26km area around each individual project's respective worst case piling locations) range from 11.49% (noting that this comprises a cumulative contribution from each of the respective subprojects to Dogger Bank Creyke Beck A&B (5.75% each)) to 0.25%).

15.46. Appendix A stated that it is clear that the actual timing of piling for each project and their final scheme design (layout, number of foundations and type of foundations) will have a material bearing

on the actual level of in-combination effect and to attempt to predict this level of detail at this stage would likely result in a significant effect being predicted where it will not actually occur.

15.47. The Applicant also considered plans or projects that are not offshore windfarms in the in-combination assessment. They noted that seismic surveys within oil and gas licence block 48/3 could contribute in-combination. The Applicant noted that the timing and exact extent of potential seismic activities by the oil and gas operator is currently unclear, the likely duration of such activities is likely to be very short (approximately one to two months) and so the potential for an overlap with the Project is low.

15.48. To allow for an additional check on the basis of up to date programme and piling/seismic proposals (and taking into account mitigation built in to the Project and the other projects and further mitigation secured by their respective consents), the Applicant suggested an amendment to Condition 8(2)(e) in draft DMLs A1 – B2 (revisions shown in red for reference):

(e) In the event that driven or part-driven pile foundations are proposed to be used, a marine mammal mitigation protocol following current best practice as advised by the statutory nature conservation agencies, *the intention of which is to prevent, amongst other things-*

i. injury to marine mammals, primarily auditory injury in the vicinity of any piling;

ii. adversely affecting the integrity, within the meaning of the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007, of a European offshore marine site or a European site (defined in regulations 15 and 24 of those Regulations respectively), to the extent that marine mammals are a protected feature of that site, and which may include, but is not limited to—

iv. identification of a Marine Mammal Mitigation Zone (MMMZ);

v. appointment of an appropriate number of suitably qualified marine mammal observer(s);

vi. methods for the detection of marine mammals within the MMMZ whether visually (by the marine mammal observer(s)) or acoustically using Passive Acoustic Monitoring equipment or other means of detection;

vii. a reporting methodology to enable efficient communication between the marine mammal observer(s) and the person responsible for approving commencement of piling;

viii. an appropriate soft start procedure whereby piling activities do not commence until an agreed time has elapsed and during which marine mammals have not been detected within the MMMZ;

ix. where appropriate, methods for the application of acoustic deterrent devices; and

x. where appropriate, consideration of the use of noise reduction at source technologies,

and for the purposes of this condition the reference to "marine mammals" means the marine mammals listed as European Protected Species in Schedule 1 to the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007.

15.49. The Applicant stated that in the unlikely event that there is a sufficient scale of in-combination activities already taking place at the time proposed by the Project for piling, such that the Project's proposed timing or methodology would be of concern, this proposed revision would allow for provision of piling restrictions, mitigations or programming restrictions. The Project could therefore come forward in a manner which avoids contributing to an adverse effect. On the basis of all of the above, the Applicant considered that a conclusion of no adverse effect on integrity resulting from

the Project in-combination with other plans and projects can be reached with a high degree of confidence.

15.50. TWT responded to the 7th April 2016 consultation to reiterate the points they made during the Examination and provide signposting to these documents[49]. The response was dated 12 April 2016.

15.51. Following the provision of information by the Applicant the Secretary of State issued a third consultation to invite comments from NE, the JNCC and any other Interested Party on the Applicant's response of 21st April 2016.

15.52. NE and the JNCC provided a joint response to the consultation on the 13 May 2016[50]. NE and JNCC confirmed that the consultation for the Southern North Sea pSAC commenced on the 19th January 2016. NE and the JNCC advised that there will be a likely significant effect on the Southern North Sea pSAC, and that an Appropriate Assessment is required. With regards to the Project the issue of concern is significant disturbance (conservation objective two) both alone and in-combination with other plans or projects. In terms of disturbance, the response noted that the key impact for the Project HRA to assess is underwater impulsive noise within the Southern North Sea pSAC.

15.53. NE and JNCC noted that porpoise are sensitive to impulsive noise from activities such as pile driving and will be displaced from the area around pile driving activities. NE noted that while 100% of porpoises are displaced from a small area around the pile driving site, the percentage of porpoise displaced decreases with distance from the site (out to approximately 50km). The response highlighted the uncertainty regarding harbour porpoise behaviour and their return time to a site from which they have been displaced. NE noted that it is uncertain as to whether there would be a different response time by porpoise to larger, and possible noisier, developments (such as this project) than to isolated windfarms using smaller piles and smaller hammer energies on which most of the scientific evidence is based.

15.54. NE and JNCC noted that a marine mammal monitoring plan is required by the DCO and that it would be appropriate for this to include monitoring during the construction phase of the Project in order to monitor return times of harbour porpoise after piling.

15.55. The response notes that the SNCBs are exploring options and developing guidance to define what can be considered as a significant disturbance to help inform the assessment of adverse effect on the pSAC. NE and JNCC advised that the Secretary of State should assess the Project against the site's draft Conservation Objectives rather than the parameters used by the Applicant which were suggested as a basis for exploratory discussions with industry and regulators.

15.56. The response states that NE and JNCC's view is that the Applicant has done all it can with the evidence currently available in terms of assessing effects from their Project alone but note that there are a number of uncertainties that remain within the assessment.

15.57. With regards to an in-combination assessment the NE and JNCC response notes that the impact of the Project has to be considered in-combination with other wind farms and other noise

[49] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-000915-The%20Wildlife%20Trusts.pdf

[50] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-001307-Joint%20Nature%20Conservation%20Bodies%20and%20Natural%20England.pdf

sources known to lead to disturbance (e.g. seismic surveys), which may combine to impact the Southern North Sea pSAC. NE and JNCC do not consider the Applicant's response of the 21 April 2016 to be a complete in-combination assessment.

15.58. The Applicant considered potential project overlaps only within the timeframe of the construction of the proposed windfarm. NE and JNCC advised that an HRA needs to consider a longer time frame- this is due to the likelihood that there will be construction of windfarms within the site for several years and any assessment of significant disturbance needs to be considered in that context.

15.59. NE and JNCC note that the assessment should be based on the worst case scenario included in the ES for other offshore wind farms and any more realistic scenarios presented either in the ES or that can be reasonably predicted. NE and JNCC advised that a more detailed analysis of in-combination effects should be carried out in order to properly characterise the potential impacts. They advised that the planned piling both temporally and spatially should be mapped, quantifying the potential % of the pSAC that could be exposed to disturbance effects and the potential duration of that disturbance, using ES predictions or any more realistic project-specific scenarios that have emerged subsequently.

15.60. NE and JNCC went on to advise that despite the uncertainties that remain there are a range of mitigation measures available that could potentially reduce the noise footprint of the Project to acceptable levels. They welcomed the Applicant's commitment to mitigating impacts on the pSAC but noted that the Applicant's suggested condition has not detailed all of the available mitigation measures (and their limitations) that could be considered in order to reduce noise levels and mitigate for disturbance.

15.61. NE and JNCC noted that a conclusion of no adverse effect on integrity can only be reached if the competent authority can be 'sure' or make 'certain' that there will be no adverse effects. They noted that the necessary certainty can potentially be gained if there are a range of viable measures secured in the DCO/DML that could be brought forward either on their own or as part of a suite of measures if required. Without such assurance they did not feel that the Secretary of State would have sufficient certainty to conclude that an adverse effect on integrity can be avoided.

15.62. NE and JNCC advised that a detailed strategy based on an assessment of the full range of mitigation measures potentially available to reduce disturbance, and a requirement to use them as necessary, should be secured in the DCO/DMLs through a requirement to produce a Southern North Sea pSAC Mitigation Strategy. They noted that this should be submitted to the MMO at least four months before the development commences.

15.63. NE and JNCC provided text for a condition to secure the details of how the piling phase of the development will avoid adversely affecting the integrity of the Southern North Sea pSAC. The suggested condition is as follows:

8.—(1) The licensed activities shall not commence until the following (insofar as relevant to that activity or phase of activity) have been submitted to and approved in writing by the MMO—…

(2) The licensed activities, or any phase of those activities, shall not commence until a Code of Construction Practice incorporating the following (insofar as relevant to that activity or phase of activity) has been submitted to and approved in writing by the MMO—…

(f) In the event that driven or part-driven pile foundations are proposed to be used, a detailed Southern North Sea possible SAC Mitigation Strategy to be approved in writing by the MMO, in consultation with Natural England and JNCC. The Southern North Sea possible SAC Mitigation Strategy will include, but is not limited to, the following potential mitigation measures, which following an assessment of their viability and efficacy in the plan would be deployed as required across the consented area or parts of it, either in isolation or as part of a package of measures:

i) seasonal restrictions to piling;

ii) scheduling of piling with respect to previous, ongoing and future piling associated with other offshore developments, based on an updated assessment of cumulative impacts;

iii) distribution of turbines within the consented area;

iv) use of alternative foundation methodologies, such as suction buckets;

v) use of noise reduction at source technologies;

vi) use of any other relevant technologies or methodologies that may emerge in the future.

15.64. The RSPB provided a response to the Secretary of State's consultation on the 13 May 2016[51]. In that response they expressed concern around the Applicant's information submitted on the 21 April 2016. In particular the RSPB did not accept that disturbance of up to 20% of this or any other proposed or designated site for a period of up to 6 years can be regarded as an acceptable basis for concluding there is no risk of harm to that site.

15.65. The RSPB noted that the evaluation of risk to harm, through both the consideration of likely significant effect and the assessment of adverse effect on integrity must be undertaken by clear reference to the distribution of species within the protected area and the importance of the particular areas to the lifecycle of the species.

15.66. TWT provided a response to the Secretary of State's consultation on the 10 May 2016[52]. They welcomed the Applicant's move away from carrying out an assessment against the MU population and a move towards a site based assessment. However, they had a number of concerns about the process the Applicant took and the conclusions reached.

15.67. TWT noted that they agreed that the immediate effect of disturbance is a temporary loss of habitat and that an HRA should consider the area of the pSAC from which porpoise would be excluded. They do not consider that this is all that should be considered and believe that numbers of animals affected should be considered. TWT stated that they do not agree with the conclusion of no adverse effect on site integrity using the Applicant's assumption that a 'significant portion' would be 20% and 'significant period of time' would be 6 years.

15.68. TWT consider that when determining the temporal impact, it should be accepted that porpoise would be excluded from the area for the duration of the piling process; i.e. 5 years, rather than just the 1.32 years of actual piling. TWT do not agree that a conclusion of no adverse effect for the project alone can be reached.

15.69. TWT also expressed disappointment in the Applicant's in-combination assessment. They considered that the Applicant did not present enough data to enable a conclusion of no adverse

[51] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-001310-Royal%20Society%20for%20the%20Protection%20of%20Birds.pdf

[52] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-001308-The%20Wildlife%20Trusts%20(2).pdf

effect on integrity to be reached with confidence for the in-combination assessment. TWT strongly disagreed with the suggestion that the provision for ensuring no adverse effect on integrity is deferred to an additional consent in the DML: they felt that a decision on consent should not be made until no adverse effect on integrity can be concluded.

15.70. WDC provided a response to the Secretary of State's consultation on the 9 May 2016[53]. WDC noted that TWT response covered their concerns in detail (and where they have been discussed above are not mentioned here). WDC strongly disagreed with the conclusion of no adverse effect on integrity. They disagreed with the suggestion that the provision for ensuring no adverse effect on integrity is deferred to an additional condition in the DML. They stated their belief that consent should not be made until no adverse effect on integrity can be concluded.

15.71. In light of the responses from NE, the JNCC and other Interested Parties the Applicant provided a further response on the 24 May 2016[54]. The Applicant's response noted that its submission of 21 April 2016 signposted and provided an interpretation of information previously submitted into the Examination in the context of the latest consultation material on the Southern North Sea pSAC. The response noted that the submission was intended to assist the Secretary of State in carrying out an Appropriate Assessment on the basis set out by NE and JNCC. Further to its 21 April 2016 submission (and in light of subsequent responses made to the Secretary of State by others), the Applicant considered it necessary to clarify certain important aspects.

15.72. With regards to the Project alone the Applicant set out in Appendix A of its 21 April 2016 response the maximum total pSAC area within which harbour porpoise avoidance behaviour may occur as a result of sequential or concurrent piling activities associated with the Project. This represents (i) the maximum pSAC overlap caused by the noisiest form of piling in the Rochdale envelope operating at the "biggest impact" piling location and (ii) the maximum pSAC overlap caused by the noisiest form of piling in the Rochdale envelope operating concurrently at the two "biggest impact" piling locations. The response notes that:

- the maximum effect (if experienced at all) would be limited to a very short period of time (the piling activity would only last a matter of hours).
- the affected area would move (and significantly reduce) over the course of the piling window as piling activities move around the array area down to a level where there is very limited (<0.5%)overlap at all.
- the overall piling activities are also temporary in nature (a maximum duration of 1.32 years within a five-year construction window), noting that this is based on an extremely precautionary assumption of pin piles taking 11.5 hours to install.

15.73. The Applicant reiterated its submissions of Appendix A (21 April 2016 response), in particular confirming that given the very limited effects from the Project alone it is considered a conclusion that there will be no significant disturbance to harbour porpoise and no adverse effect on integrity resulting from any design scenario considered within the Project's design envelope can be confidently reached.

[53] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-001309-Whale%20and%20Dolphin%20conservation.pdf

[54] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-001311-Response%20to%20the%20Department%20of%20Energy%20and%20Climate%20Change.pdf

15.74. With regards to in-combination effects the Applicant repeated the list of projects identified as having the potential to overlap with the pSAC within the same or adjacent calendar years as the Project and specified each respective project's average levels of overlap with the pSAC (including its summer and winter components) boundary (based on a 26km area around each individual project's respective worst case piling locations). The values are presented based on sequential piling scenarios, and also concurrent where this represents a potential build out scenario. The Applicant expressed that to consider only the maximum overlap when characterising any given project's contribution to an in-combination effect would be wholly unrealistic (as this represents a single pile location only, after which all others will have a lesser effect). The Applicant therefore considered average values more appropriate. The Applicant identified the potential timing within which piling activity may take place for each identified project. The Applicant divided the projects into tiers dependent on how far through the process of consenting and developing the windfarm they are.

15.75. The Applicant noted that although it is impossible to predict with precision, at this stage, which of the projects will come forward together (and in what form), it is, possible to consider the worst case scenario (within which each of the various permutations fall) and to secure potential mitigation which could be employed and would be effective in avoiding the Project from causing any adverse effect on integrity alone or in-combination, in any circumstance.

15.76. The Applicant pointed out that it is important to recognise that summing all of the average overlap areas will lead to artificially high results as it is, in practice, wholly unrealistic that all projects will come forward at the same time. The Applicant noted that in the event that a number of projects do come forward at the same time, especially when located in proximity, there will be overlap of the spatial effect footprints within the pSAC, meaning that the overall pSAC area affected will be significantly less than the sum of the various individual project impacts.

15.77. The Applicant's submission suggested that a number of the identified projects could come forward to pile at the same time as the Project (and/or soon before or after the Project) without the prospect of significant disturbance to harbour porpoise or an adverse effect on integrity of the Southern North Sea pSAC.

15.78. The Applicant however noted that to account for some very unlikely scenarios, where a number of projects wish to come forward with their worst case piling proposals at the same time as the Project, it is possible that the Secretary of State may wish to impose additional controls as part of his Appropriate Assessment. The purpose of the amended condition proposed by the Applicant (in its 21 April 2016 submission) was to secure that further mitigation. The proposed revision would allow for provision of piling restrictions, mitigations or programming restrictions.

15.79. The Applicant considered that it is important that any condition imposed has a clear trigger for the application of mitigation. The Applicant's proposed condition wording (in its 21 April 2016 submission) was intended to provide a mechanism for confirming which elements (if any) of the available, secured mitigation package it was necessary to employ in light of the other in-combination proposals being actioned at the time of signing off the plan for the Project. The Applicant was clear that it was not intended to represent a "deferred" Appropriate Assessment.

15.80. Following the 21 April 2016 submission the Applicant worked further on a potential condition. The Applicant suggested that the addition of a new paragraph in condition 8(2) of the draft Deemed Marine Licences A1-B2 (as paragraph (l) in DML A1 and B1 and paragraph (k) in DML A2 and B2) would more clearly deliver the additional controls which the Secretary of State may wish to impose as part of the Appropriate Assessment. The proposed condition is as follows:

(l/k) (i) In the event that driven or part-driven pile foundations are proposed to be used, a detailed Southern North Sea pSAC Mitigation Plan providing for appropriate mitigation, if any such mitigation is required

(ii) For the purposes of this paragraph (l/k) —

"appropriate mitigation" means such mitigation as is necessary to prevent the Project from causing an adverse affect on integrity, within the meaning of the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007, of the Southern North Sea possible special area of conservation to the extent that marine mammals are a protected feature of the site;

"marine mammals" means the marine mammals listed as European Protected Species in Schedule 1 to the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007; and

"Southern North Sea possible special area of conservation" means the Southern North Sea site proposed for designation as a special area of conservation for harbour porpoise and consulted on as a possible special area of conservation from January 2016 until May 2016 or, where this site becomes a European offshore marine site or a European site (as defined in regulations 15 and 24 of the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 respectively), that European offshore marine site or European site.

15.81. The Applicant suggested that the new paragraphs be referenced within condition 8(5)(a) (for DML A1 and B1) and 8(5)(b) (for DML A2 and B2) (requiring the MMO to consult with the SNCBs on the plan).

15.82. Following this submission from the Applicant the Secretary of State invited views on the 26 May 2016 from NE and the JNCC, and any other Interested Party, on the Applicant's information.

15.83. NE and JNCC provided a joint response on the 23 June[55] 2016. They noted that with regards to the Project alone they did not have further comments to make beyond their 13 May 2016 response, except for reiteration of a point in their previous submission that harbour porpoise being disturbed from a preferred foraging area (such as the pSAC) could have implications for their survival.

15.84. In relation to potential in-combination impacts NE and JNCC welcomed the additional information provided by the Applicant. They recommended that the Appropriate Assessment should consider the estimated maximum and minimum spatial footprints within the pSAC resulting from potentially concurrent piling. Whilst NE and JNCC consider that piling vessel availability may be a realistic limitation, they consider that the Secretary of State should be mindful that current limitations could change in the future (e.g. more piling vessels could become available), and not place undue reliance on this point in the Appropriate Assessment.

15.85. In terms of in-combination impacts, considering both the averaged and maximum values, NE and JNCC continue to have concerns about the possibility of overlapping construction schedules

[55] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002002-Hornsea%202_NE%20and%20JNCC%20Response.pdf

amongst all planned windfarms and the extent of porpoise habitat that could be affected inside the Southern North Sea pSAC. They note that the calculations provided by the Applicant do not take into account any other noisy activity taking place at the same time. As such, NE and JNCC could not advise the Secretary of State that an adverse effect on site integrity could be avoided in the absence of mitigation.

15.86. NE and JNCC agree with the mitigation condition being stand alone rather than forming part of the MMMP, as suggested by the Applicant in their 24th May 2016 submission. However, NE and JNCC believe the condition should detail the range of viable mitigation measures that would be employed, as set out in their previous response, dated 13 May 2016.

15.87. NE and JNCC reiterated that a conclusion of no adverse effect on integrity can only be reached if the Secretary of State can be sure or make certain that there will be no adverse effects on the Southern North Sea pSAC. The response noted that if the Secretary of State agrees that mitigation may be required in order to reach a conclusion of no adverse effect on integrity and accordingly applies a condition to legally secure that mitigation, in doing so he will need to have a high degree of confidence that mitigation can ultimately be delivered post-consent. NE and JNCC note that their condition requires the submission of the Southern North Sea possible SAC Mitigation Strategy to the MMO four months in advance of piling commencing. They note that it will be vital that the Applicant accepts stringent requirements to review the need for mitigation and agree with the regulators and advisors a programme of required measures considerably earlier than this, to ensure that they can secure appropriate equipment and installation contracts and ultimately comply with the Secretary of State's condition.

15.88. The MMO responded on the 24 June 2016[56]. They stated that as the body responsible for monitoring compliance and undertaking enforcement under the DMLs any mitigation required as a result of the project HRA undertaken by the Secretary of State is effectively secured in the DMLs.

15.89. The MMO noted that the worst case scenario must be considered within the HRA and that the assessment will need to consider any mitigation deemed necessary to conclude no adverse effect for the project to be permitted. It is the view of the MMO that any mitigation deemed necessary to permit the project must be intrinsic, effective and reasonably deliverable, and be accurately and specifically reflected in relevant DML conditions.

15.90. The MMO noted that following the decision new information may become available on the scope and timing of other plans and projects with the potential to change the magnitude of the predicted in-combination effect on the site prior to construction. As such the MMO noted that they will need to take this into consideration when discharging licence conditions and consider whether additional mitigation is required. The MMO noted that the Applicant proposed a mechanism for capturing this additional mitigation with the addition of a DML condition. The MMO agreed with the principle of adopting an additional condition requiring approval of a Southern North Sea pSAC Mitigation Plan.

15.91. The response noted that the Southern North Sea pSAC Mitigation Plan condition should outline the types and magnitude of intrinsic mitigation determined through the HRA and any additional

[56] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002008-H2%20MMO%20Response%20to%20DECC%20Letter%20of%2026%20May%202016.pdf

methods that will likely need to be considered in order to prevent adverse effects on site integrity should any additional in-combination effects be predicted post-consent. The response stated that as it is possible for the project parameters to be refined to result in less of an effect to the site, any DML conditions adopted should contain a provision for approval to be sought from the MMO to reduce the stated mitigation if the project envelope is reduced.

15.92. WDC responded to the consultation on the 23 June 2016[57]. They reiterated the concerns highlighted in their earlier responses in relation to the sensitivity of harbour porpoise to disturbance. They noted that the population impacts of harbour porpoises should be considered as part of the HRA. WDC highlighted that in the ES, the Applicant concludes that the impact from the project on harbour porpoise would be a 'moderate adverse' disturbance, which is significant in terms of the EIA. WDC believe this will be significant in terms of the HRA due to the overlap of the project with the pSAC. They noted that when assessing the risk to the integrity of the pSAC, the impacts for the number of individuals that are supported by the site must be assessed, as well as considering the area of habitat that would be affected.

15.93. WDC strongly disagreed that the piling impacts are temporary. They noted that although the piling activity will have a maximum duration of 1.32 years, this will take place over the 5 year construction window where there is likely to be repeated disturbance during this time. WDC noted that five years is a significant amount of time in the context of the lifespan of a harbour porpoise and will affect breeding and feeding activity.

15.94. WDC noted that they were concerned by the lack of baseline evidence as to the numbers of harbour porpoise the pSAC supports, the distribution within the site and the nature of how animals use the site. Their written representation stated that they believed the methodology for assessing marine mammal numbers was inadequate. They state that it cannot be concluded there is no adverse effect on the integrity of the pSAC as there is a lack of reliable data on which to base an assessment.

15.95. WDC do not believe that the Applicant has given adequate consideration to the cumulative impacts of other planned wind farm developments in the area, and believe the Applicant does not have sufficient evidence to claim there will be no adverse impacts on the integrity of the pSAC. WDC consider that the cumulative impacts from the construction of all the other planned wind farms must be considered, as there will be multiple construction periods over many years that may have longer term impacts than just during any direct overlap.

15.96. WDC stated that they believe that current mitigation measures are not enough to ensure there will be no adverse effect on site integrity of the pSAC either from the Project alone, or from the cumulative impacts with other offshore wind farm developments. They disagree with the Applicant's conclusion that there will be no long term negative impacts to the harbour porpoise population and consider that further mitigation measures are essential. WDC state that if foundations requiring piling activities are to be used further mitigation measures, in addition to those outlined by the SNCBs, are essential as they feel that the mitigation measures on their own are not adequate to ensure no adverse effect on site integrity. They note that the additional mitigation measures must

[57] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-001999-WDC_Response_Hornsea.pdf

be available at the time of construction and be proven effective to ensure that it can be concluded that there will be no adverse effect on the integrity of the pSAC. If mitigation measures to reduce the impact on harbour porpoises and ensure there is no adverse effect on site integrity cannot be guaranteed, then foundations requiring piling should not be authorised.

15.97. TWT submitted two responses to the consultation, the first on the 26 May 2016[58] and the second on the 14 June 2016[59]. TWT raised similar concerns to WDC and only those which are different are discussed below.

15.98. In the response of the 26 May 2016 TWT clarified that they do not consider that the Applicant's proposed condition goes far enough to secure the mitigation that may be required should pile driving be used and as such believe that there is a need to better secure mitigation in the DMLs. Although they state a preference for the condition proposed by NE and the JNCC they note that they are still concerned that it does not go far enough and that without a guarantee of mitigation if pile driving is to be used, they do not believe that no adverse effect on integrity can be concluded. They concluded that there needs to be a guarantee of secured mitigation or the removal of the pile driving option in the event that no mitigation is available.

15.99. TWT's response of the 14 June 2016 was submitted to clarify their position in relation to harbour porpoise. TWT considered that it is not possible to conclude that there will not be an adverse effect on site integrity from the project alone. This is due to:

- The Applicant's ES concluding a 'moderate adverse' disturbance on harbour porpoise in EIA terms which is likely to be significant in HRA terms.
- The view that the site level population should be considered.
- Disagreement that putting an arbitrary threshold on what the level of impacted habitat should be is acceptable.
- Disagreement that the impact on harbour porpoise is temporary. TWT consider that the impact should be considered over the whole five-year construction window.
- The view that there are considerable levels of uncertainty around many aspects of the impacts of noise on harbour porpoise and that to conclude no adverse effect on integrity there can be no scientific doubt.

15.100. TWT state that it is not possible to conclude beyond reasonable doubt that the project, in-combination with other planned wind farm developments will not have an adverse effect on site integrity. They note that the Appropriate Assessment must be carried out on the worst case scenario and that consideration is needed over the longer term in-combination impacts of the site, not just the period of construction overlap.

15.101. With regards to mitigation options TWT do not believe that it is acceptable to rely on mitigation which is currently not available and has no guarantee of being available at the time of construction to reach a conclusion of no adverse effect on integrity. TWT conclude that in their view in order to be able to conclude no adverse effect on integrity on the harbour porpoise pSAC at the time of a

[58] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002007-Wildlife%20Trusts%20submission%201.pdf

[59] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002005-wildlife%20trust%202%20.pdf

consent decision, there needs to be a guarantee of secured mitigation or the removal of the pile driving option in the event that no mitigation is available.

15.102. The RSPB offered a response on the 24 June 2016[60]. The response notes that in relation to the impact to porpoise the identification and assessment of the maximum effect must reflect the likely response of the species to the proposed disturbance event. They considered that the key issue is not how long the piling operation will last, but rather when the displaced harbour porpoise are likely to return to the area once the work has finished.

15.103. The RSPB questioned the statement from the Applicant that the affected area would significantly reduce over the course of the piling operations. The RSPB consider that there is a risk that ongoing piling operations progressively drive harbour porpoise from particular parts of the pSAC. The RSPB consider that conclusion that the affected area would significantly reduce over the course of the piling operations could only be given with a clear understanding of how the timing and location of piling operations relate to the temporal and spatial distribution of the harbour porpoises utilising the pSAC.

15.104. The RSPB considered that the Applicant had not related the duration of construction to the ecological requirements of harbour porpoise or the likely impacts upon its use of particular areas of its lifecycle. They consider that without this information it is not possible to evaluate the likely impact on harbour porpoise in any meaningful way. In addition they consider that the approach of looking at area of the pSAC affected is the wrong receptor and serves to downplay the likely impact on the harbour porpoise.

15.105. The RSPB consider that it is essential for the Applicant to be able to demonstrate a clear understanding of how the impacts of construction activities will impact upon the harbour porpoises that reside within the Southern North Sea pSAC. The RSPB considered that the information provided by the Applicant on the 24 May 2016 failed to do this and considered that further work should clearly relate the construction impacts to the ecological requirements of and possible impacts to the harbour porpoise.

15.106. The Secretary of State issued a further consultation on the 12th July 2016. The consultation noted that earlier responses from the Applicant and NE provided suggested conditions such that should mitigation be required it is secured to ensure no adverse effect on integrity of the Southern North Sea pSAC. The consultation noted that should the Secretary of State decide to make an order granting development consent, he was minded to add provisions to condition 8 (pre-construction plans and documentation) of each proposed deemed marine licence. The proposed provisions are below:

(6) In the event that driven or part-driven pile foundations are proposed to be used, the MMO must not approve the plan referred to in sub-paragraph (1) or the Code referred to in sub-paragraph (2) unless the MMO is satisfied that either the plan or Code (or both of them) provide such mitigation as is necessary to avoid adversely affecting the integrity (within the meaning of the 2007 Regulations) of a relevant site, to the extent that marine mammals are a protected feature of that site.

(7) The mitigation referred to in sub-paragraph (6) may include (without limitation)-

[60] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002000-RSPB%20Response%20to%20Request%20for%20Comments%20on%20the%20Application%20for%20the%20Proposed%20Hornsea%202%20Offshore%20Wind%20Farm.pdf

(a) seasonal restrictions to piling;

(b) scheduling of piling, having regard to previous, ongoing and future piling associated with other offshore developments, based on an updated assessment of cumulative impacts;

(c) changing the location of wind turbine generators;

(d) the use of alternative foundation methodologies, such as jacket foundations (suction piles) or gravity base foundations;

(e) the use of noise reduction at source technologies;

(f) the use of other relevant technologies or methodologies that may emerge in the future.

(8) In sub-paragraph (6), "relevant site" means-

(a) a European offshore marine site;

(b) a European site;

(9) For the purpose of sub-paragraph (6)-

(a) the Southern North Sea possible special area of conservation must be treated as a European offshore marine site until-

(i) that area (or any part of it) becomes a European offshore marine site or a European site; or

(ii) it is decided that no part of that area should be a European offshore marine site or a European site; and

(b) harbour porpoise must be treated as a protected feature of the Southern North sea possible special area of conservation.

(10) In this condition-

(a) "2007 Regulations" means the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007;

(b) "European offshore marine site" has the meaning given in regulation 15 of the 2007 Regulations;

(c) "European site" has the meaning given in regulation 24 of the 2007 Regulations;

(d) "Southern North Sea possible special area of conservation" means the Southern North Sea possible special area of conservation as set out in the JNCC 2016 Harbour Porpoise Possible Special Area of Conservation Consultation dated January 2016.

15.107. The consultation also noted that the Secretary of State was minded to add the following underlined words to paragraph (2)(e) of condition 8 of each proposed deemed marine licence, which reflects provision made in other development consent orders, such as the Dogger Bank Teesside A and B Offshore Wind Farm Order 2015:

(e) in the event that driven or part-driven pile foundations are proposed to be used, a marine mammal mitigation protocol, <u>the intention of which is to prevent injury or disturbance to marine mammals</u>, following current best practice as advised by the statutory nature conservation agencies, which may include, but is not limited to…

15.108. The Secretary of State requested the observations of the Applicant, NE, the JNCC, the Marine Management Organisation and any other interested party on the above requirement.

15.109. The Applicant responded to the consultation on the 19 July 2016[61]. The response noted that the Applicant is content with the provisions, subject to suggested revisions provided in the response.

15.110. The Applicant noted that the Secretary of State's proposed provisions link the mitigation to be secured under the new provisions to the approval of the plan to be approved under paragraph (1) of Condition 8. The Applicant stated that it did not consider this link to be appropriate. The Applicant noted that whilst the MMO will be the ultimate approving body under both of these proposed provisions, they will be obliged to consult with different bodies as part of their approval process and the Applicant considers it to be imperative that a situation does not arise whereby the MMO is faced with competing considerations, particularly in relation to offshore health and safety matters. The Applicant therefore considered it appropriate to keep the sign-off process distinct between the respective provisions to avoid such potential conflict. The Applicant's response set out its proposed changes to the provisions. The Applicant considered that no flexibility has been lost as a result of the proposed amendments; they consider that it would keep processes distinct and avoids any scope for unnecessary project delays.

15.111. The response from the Applicant also noted that the Secretary of State is proposing to revise the wording of paragraph (2)(e) of Condition 8 of Version 8 of the draft DMLs to insert additional wording. The response notes that although the Applicant does not object in principle to the insertion, the Applicant does not consider it to be appropriate to specify the prevention of disturbance in such an unqualified manner. The Applicant's HRA recognised that a degree of disturbance to marine mammals is likely to occur, irrespective of the final Project design, but that such disturbance would remain within acceptable limits. Accordingly, as the total avoidance of disturbance is unlikely to be possible, the Applicant has sought to further revise the Secretary of State's suggested drafting to refer to "significant disturbance" and to refer to the definition of 'disturbance' within regulation 39(1)(b) of the Offshore Habitats Regulations. The Applicant set out their suggested wording within their response.

15.112. NE and JNCC provided a joint response on the 19 July 2016[62]. NE and JNCC welcomed the additional provisions. They reiterated their previous response that the conclusion of no adverse effect on integrity for the Southern North Sea pSAC can only be reached if the Secretary of State can be 'sure' or make 'certain' that there will be no adverse effects. NE and JNCC noted that the necessary certainty can potentially be gained if there are a range of viable measures secured in DMLs that could be brought forward either on their own or part of a suite of measures if required. NE and JNCC noted their support for the inclusion of all of the mitigation measures; they also welcomed the acknowledgment that other technologies or methodologies may emerge in future that could be relevant.

15.113. NE and JNCC advised that details regarding mitigation measures to avoid significant disturbance to the pSAC should be captured in a standalone plan rather than forming part of the MMMP. As noted above the response from NE and JNCC of the 13th May 2016 recommended the development of a Southern North Sea pSAC Mitigation Strategy and that this should be secured in

[61] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002065-Dong-%20Hornsea%20Project%202.pdf

[62] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002063-NE%20Response.pdf

the DCO following the conclusions in the Appropriate Assessment. In the 19 July 2016 response NE and JNCC agreed that any condition involving mitigation to the Southern North Sea pSAC should be incorporated into the Plan referred to in condition 8(1) and the code of construction practice in condition 8(2).

15.114. NE and JNCC reiterated the advice provided in their previous response that if the Secretary of State agrees that mitigation may be required in order to make certain a conclusion of no adverse effect on integrity and accordingly applies a condition to legally secure that mitigation, the Secretary of State will need to have a high degree of confidence that mitigation can ultimately be delivered post-consent. NE and JNCC noted that it will be vital that the Applicant accepts stringent requirements to review the need for mitigation and agree with the regulators and advisors a programme of required measures as early as possible, to ensure that they can secure appropriate equipment and installation contracts and ultimately comply with the Secretary of State's condition.

15.115. NE and JNCC therefore advised that the Secretary of State set out in the Appropriate Assessment the following:

- For each of the mitigation options currently available, or likely to become available in the future, in what way may these result in the avoidance of significant disturbance of the harbour porpoise, and therefore allow the conclusion of 'no adverse effect beyond reasonable scientific doubt'.
- How the Secretary of State envisages mitigation should be agreed and secured in the period between consent (should it be granted) and the commencement of piling.

15.116. NE and JNCC noted general agreement with the additional wording proposed by the Secretary of State to paragraph (2)(e) of condition 8 of each proposed DML but would suggest that the wording is replaced with '*injury* ***and*** *disturbance'*. NE and JNCC also noted that the MMMP, required under paragraph (2)(e) of condition 8, is applicable to all marine mammals. Therefore, any requirement to mitigate impacts to the Southern North Sea pSAC for harbour porpoise specifically should be captured in a Southern North Sea pSAC Mitigation Strategy.

15.117. The MMO provided a response on the 19 July 2016[63]. The response stated that the MMO considers that the proposed mitigation is not adequately defined to ensure that it will be effective and deliverable to be able to conclude no adverse effect on site integrity of Southern North Sea pSAC. The MMO requests that if additional mitigation measures are referred to within sub-paragraphs (a)-(e), that they meet the criteria stipulated below:

(i) What the measure is, and how it would avoid or reduce effects;

(ii) How it would be implemented and by whom;

(iii) The degree of confidence in its likely success;

(iv) The timescale of when it would be implemented, maintained and managed;

(v) How the measure would be secured, monitored and enforced; and how any failures will be rectified.

15.118. The MMO considered that the proposed condition 8(7) should be updated once the AA has been completed to clearly define the specific additional mitigation measures as deemed necessary

[63] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002066-MMO.pdf

in order to conclude no adverse effect. This will allow the MMO to ensure the mitigation is implemented post-consent rather than define what mitigation is required.

15.119. The MMO noted that they wished to understand the justification behind the additional wording proposed to paragraph (2)(e) of condition 8, as they are content with the drafting of the original wording. The MMO note that the JNCC guidance 'Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise' dated August 2010 explicitly states that it is not to prevent disturbance to marine mammals.

15.120. The MMO further noted that should the Secretary of State consider that the mitigation detailed in proposed condition 8(7) (a)-(e) as per the Secretary of State's letter dated 12 July 2016 is adequate, then this should be included within the DCO rather than the DMLs. The MMO noted that this will ensure that the mitigation can be implemented by the Secretary of State rather than relying on another regulator to define appropriate mitigation and ensure its timely delivery.

15.121. TWT provided a response to the consultation on the 19 July 2016[64]. TWT stated agreement that further condition/s are needed, with specific detail of mitigation measures, to ensure that there will be no adverse effect on integrity of the Southern North Sea pSAC. TWT noted that without further mitigation, they believe that the impact from underwater construction noise would contravene the 'no significant disturbance' conservation objective for the site. TWT consider that the proposed conditions go some way to delivering this, but have remaining concerns regarding aspects of the conditions.

15.122. TWT noted that there is still no guarantee that any further mitigation measures would be required, as the decision regarding the extent and type of mitigation has been deferred to the MMO. TWT accept that it is reasonable to determine the exact mitigation needed closer to the time of construction, when more about the project specification, cumulative impacts and viability of mitigation measures are known. TWT noted though that in reaching a consent decision, the Secretary of State has to be certain that there will be no adverse effect on integrity of the site. TWT noted that the present condition gives the MMO a very high degree of discretion as to the mitigation needed to be satisfied of no adverse effect on integrity. TWT noted that they have not seen an explanation of what level of impact the Secretary of State believes would constitute an adverse effect on integrity and therefore no indication of the amount of mitigation required to ensure no adverse effect on integrity. TWT therefore concluded that they have no understanding of the MMO's mechanism to determine what level of mitigation would be required or how they would decide which of the possible measures should be used.

15.123. TWT noted further concerns that some of the measures listed may not be technically viable by the time of construction or be feasible in the site. They stated that the Secretary of State should not, at the point of making a consent decision, rely on measures (d) – (f) and must be satisfied that, if only measures (a) – (c) were available, these would be sufficient to ensure no adverse effect on integrity. TWT noted that as they have not seen an opinion of the Secretary of State as to what constitutes an adverse effect on integrity and what level of mitigation would be required to remove the risk of adverse effect on integrity, they cannot conclude whether measures (a) – (c) are sufficient.

[64] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002060-TWT.pdf

15.124. TWT also noted that with specific regard to measure (c), although they agree with its inclusion, they consider that further refinement of the text is needed to ensure its correct interpretation. They noted that their understanding is that this measure means that the layout could be designed so that fewer turbines are located within the pSAC and/or that turbines are placed at the greatest possible distance from the pSAC boundary. However, given the strict restrictions on turbine layout, due to navigation and safety requirements, TWT believe this measure should be better described.

15.125. TWT noted that they strongly believe there needs to be an opportunity for public participation both in the determination of the mitigation required for the pSAC and the MMMP.

15.126. TWT also noted that they would like to see further clarification of the additional wording suggested for paragraph (2)(e) of condition 8 of the deemed marine licences. They suggested that it should be 'injury and/or disturbance' and suggested that this is defined as 'within the meaning of the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007, Regulation 39'.

15.127. WDC provided a response on the 19 July 2016[65]. The position of WDC was the same as TWT in that they considered that further mitigation measures are required to ensure that there will be no adverse effect on the pSAC. WDC noted that the proposed measures are a step towards mitigating a breach of the site's conservation objectives in relation to 'no significant disturbance of the species' but they still had some concerns. WDC noted that under the Secretary of State's suggested condition the MMO has responsibility for making the decision on which mitigation measures are to be used if driven or part-driven pile foundations are to be used. WDC noted their understanding that the MMO will consult with the relevant SNCBs on this matter. WDC requested to be involved in those discussions, along with other NGOs, to ensure that any mitigation methods are suitable for the development. WDC highlighted concerns that there is still no guarantee that mitigation measures will be used. WDC would like to see a commitment to the use of effective mitigation methods, and adequate monitoring. WDC noted the same concerns as TWT in relation to the viability of some mitigation measures listed in the proposed provision. WDC also stated that they would like a guarantee that if there are no proven technologies by the time construction starts, that the project does not have the consent to proceed.

15.128. WDC noted that they are pleased to see the inclusion of a Marine Mammal Mitigation protocol (MMMP) in condition 8(2)(e) and would recommend a slight change in wording to "the intention of which is to prevent injury AND disturbance to marine mammals".

15.129. The RSPB provided a response on the 19 July 2016[66]. The RSPB reiterated that their concerns in relation to harbour porpoise were largely in relation to the way in which the assessment of impacts upon the Southern North Sea pSAC had been approached, in particular the reliance upon thresholds for time and area which the RSPB considered to be over-generous and lacking the necessary level of precaution.

15.130. The RSPB noted that they considered the draft conditions carefully, and concluded that they do not directly address the concerns they previously raised, which were about the assessment of the impacts of the scheme at the DCO stage, rather than control mechanisms that might be put in place at a subsequent stage. The RSPB noted that there is no obligation upon the MMO to impose

[65] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002059-WDC.pdf
[66] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010053/EN010053-002061-RsPB.pdf

conditions. The response stated that given the information that is currently available the RSPB consider that it is unlikely that it will be possible for works to be consented without a DCO, and therefore question why the application of mitigation provisions is not being made mandatory to ensure that the least potentially disruptive construction techniques are deployed. The RSPB concluded by deferring on this position to the Wildlife Trusts who are better placed to comment on the likely efficacy of the draft provisions.

Secretary of State's Consideration of the Southern North Sea pSAC

15.131. The Secretary of State has considered the various responses received following the end of Examination and the launch of consultation on the Southern North Sea pSAC. In particular the Secretary of State has considered a worst case scenario to determine whether the Project will adversely effect the Southern North Sea pSAC and its designated feature, harbour porpoise. The Secretary of State is aware that NE and JNCC are in the process of agreeing management objectives for the Southern North Sea pSAC but as these are currently not published the Secretary of State notes the advice of NE and JNCC and will assess the effects of the Project against the draft Conservation Objectives of the Southern North Sea pSAC.

15.132. The Secretary of State agrees with the Applicant and Interested Parties that the key impact to harbour porpoise from the Project is underwater noise associated with the construction stage of the project, the key issue is underwater impulsive noise. The Secretary of State agrees with NE and JNCC that the key conservation objective to be considered is 'Conservation Objective 2: There is no significant disturbance of the species'. The Secretary of State notes the advice of NE and JNCC and has considered the planned installation of windfarms within the site as well as other activities with the potential to disturb porpoise. The Secretary of State notes the response of NE and JNCC of 1 April 2016 which recommended that the assessment that DECC Oil and Gas are undertaking for their sector is used as a reference. However, as this document is not yet publically available the Secretary of State has not considered this document.

15.133. The Secretary of State notes that Condition 8 of the recommended DMLs provides for the submission to and approval by the MMO of a Marine Mammal Mitigation Protocol in advance of works commencing, and this is to be implemented during construction. This is in the event of driven or part-driven foundations being proposed. The MMMP, following best practice as advised by the SNCBs, would detail mitigation measures and would be part of an agreed CoCP. These may include 'soft-start' piling in the event of driven or part-driven pile foundations, identification of a marine mammal mitigation zone and/or detailed methods to be employed within such a zone. NE agrees that this mitigation is sufficient in relation to reducing injurious effects or permanent auditory injury to marine mammals. The Secretary of State agrees with this conclusion and notes that an in principle MMMP has been drafted and agreed by the Applicant, NE and the MMO. The Secretary of State notes that due to changes to Condition 8 (discussed below) further discussion on what the final MMMP will contain will likely be required before it is approved.

15.134. NE's response of the 13 May 2016 highlighted uncertainties around harbour porpoise return times to the site following piling and suggested that the Marine Mammal Monitoring Plan include monitoring during the construction phase of the Hornsea 2 project, in order to monitor return times

of porpoise post-piling. The Secretary of State acknowledges this issue and agrees with the suggestion that monitoring return times should be included within the marine mammal monitoring plan secured by Condition 8(2)(h).

15.135. The Secretary of State notes that discussion was had during the Examination in relation to both the Disturbance Effect on the Harbour Porpoise in the North Sea (DEPONS) model and the next Population Consequences of Disturbance (PcOD) update. NE noted that work at a strategic level using the DEPONS model and PCoD model will help to assess the consequences of disturbance due to pile driving in the North Sea, at a population level. Neither of these models is currently available. As discussed further below the Secretary of State has made changes to Condition 8(2)(e) to ensure that the intention of the MMMP is to prevent injury and/or significant disturbance to marine mammals. The Secretary of State notes that results from DEPONS and PcOD will help to inform mitigation and monitoring options that may be required at the project site as part of the MMMP or plan for marine mammal monitoring.

15.136. The Secretary of State notes that should piling be required to install foundations, an application for a European Protected Species (EPS) licence would be required to ensure no offence is committed pursuant to regulation 39 of the Offshore Habitats Regulations. During the Examination the Applicant provided a draft EPS Licence Method Statement and Supporting Information (Offshore) document. This provided evidence to inform the MMO's considerations relevant to the 'purpose' and 'no satisfactory alternatives test' [APP-0167]. The MMO provided a letter of comfort confirming that, based on the information in the draft ES at the section 42 consultation stage, an EPS licence would be required (should piling be undertaken) and that it is reasonable to expect such a licence would be granted by the MMO [7.4.20]. However, the MMO highlighted that this could not be guaranteed at that stage because of the potential for future changes in the Project.

15.137. The Secretary of State notes from the Applicant's response of the 24th May 2016 that the maximum total pSAC area within which harbour porpoise avoidance behaviour may occur as a result of concurrent piling activities associated with the Project alone is 7.82% (for sequential piling the figure is 5.37%). This will therefore result in a loss of this area of the pSAC for harbour porpoise. The Secretary of State notes that the maximum duration of effect is influenced by the number of piles which in turn is influenced by the number and type of foundations. The Applicant predicted a temporal maximum adverse scenario, based on jacket foundations, of a maximum duration of piling of up to 1.32 years within a five year construction window.

15.138. The Secretary of State notes that advice from NE and JNCC that a longer timeframe than just the construction of the proposed windfarm should be considered as there is a likelihood of construction of windfarms within the site for several years and the advice of TWT and WDC that piling should be considered for the 5 year construction window due to the likely repeated disturbance.

15.139. The Secretary of State notes that the Applicant's response of the 24 May 2016 includes the list of projects identified as having the potential to overlap with the pSAC within the same or adjacent calendar years as the Project and has specified each respective project's average levels of overlap with the pSAC (including its summer and winter components) boundary (based on a 26km area around each individual project's respective worst case piling locations). The values are presented

based on sequential piling scenarios, and also concurrent where this represents a potential build out scenario. The Secretary of State notes that for the Project in-combination the worst case overlap with one other project is with Dogger Bank Creyke Beck A and B, overlapping 14.52% of the pSAC (if concurrent piling is carried out). The Secretary of State considers that if additional projects are piling at the same time (according to Table 2 in the Applicant's response of 24 May 2016 there are up to four other projects which could be constructing at the same time) then the percentage area of the pSAC which could be affected by piling activities could be much greater. The Secretary of State notes the Applicant's view that considering only the maximum overlap when characterising any given project's contribution to an in-combination effect would be wholly unrealistic but considers it necessary to consider the worst case scenario. The Secretary of State notes that the Applicant has also presented in-combination figures from oil and gas seismic surveys which suggest that less than 1% of the pSAC would be impacted by seismic surveys of block 48/3.

15.140. As noted above the Secretary of State considers that the key impact to harbour porpoise from the development in-combination results from piling with other offshore windfarms and seismic surveys. The Secretary of State has also considered the impacts of other activities such as the effect of commercial fishing.

15.141. The Secretary of State notes that the JNCC and NE Draft Conservation Objectives and Advice on Activities states that a HRA will be considered for all new developments (coastal and marine) using pile driving within the site or within 26km of site boundaries. This document notes that if additional mitigation is required, planning and management of pile driving activities may be needed within the site to ensure the Conservation Objectives are met. There is potential for a reduction or limitation of the disturbance/displacement effects by varying the schedule of piling, particularly if several developments are constructing at the same time and pile driving footprints do not overlap (i.e. maximising area from which porpoise are excluded). Limited spatio-temporal restrictions may be needed. Other examples of mitigation include the use of sound dampers, methods that create a barrier to sound transfer (e.g. bubble curtains) and, more effectively, the use of alternative foundation types (e.g. gravity foundations, suction cups, floating turbines, drilling) that do not require piling. Scheduling of activities may minimise cumulative exclusion from areas.

15.142. The Secretary of State notes that for the Southern North Sea pSAC the harbour porpoise population needs to be maintained rather than restored. Maintain implies that, based on existing understanding, the feature is regarded as being in favourable condition and will, subject to natural change, remain in this condition after the site is designated (JNCC consultation documents, 2016).

15.143. The Secretary of State notes that the timing of construction of offshore windfarms is uncertain and notes that better mitigation measures may be available by the time of construction. The Secretary of State does not however rely on this and as noted above the Secretary of State will consider the worst case for this assessment. As noted above the Project has the potential in a worst case to result in avoidance behaviour of an area much greater than 14.52% of the pSAC in-combination with other offshore windfarm projects. The Secretary of State notes that seismic surveys will also have in-combination impacts with the Project. The Secretary of State therefore agrees with NE that an adverse effect on integrity cannot be ruled out without additional mitigation.

15.144. The Secretary of State has included further provisions to reach a conclusion of no adverse effect on integrity. The Secretary of State considered the advice of NE and the JNCC that there should be a separate Southern North Sea pSAC mitigation plan but considers that the provision should remain as consulted on and within condition 8. This is to ensure that the Southern North Sea pSAC and necessary mitigation is considered within all other plans. The wording of the provision remains the same as consulted on by the Secretary of State on the 12 July 2016, aside from an addition as noted in bold below and in other minor respects as set out below:

(6) In the event that driven or part-driven pile foundations are proposed to be used, the MMO must not approve the plan referred to in paragraph (1) or the code referred to in paragraph (2) unless the MMO is satisfied, ***after consulting such persons as the Secretary of State may specify in relation to the plan or the part of the code specified by the Secretary of State (in addition to the persons with whom consultation is otherwise required under this Condition)****, that either the plan or code (or both of them) provide such mitigation as is necessary to avoid adversely affecting the integrity (within the meaning of the 2007 Regulations) of a relevant site, to the extent that marine mammals are a protected feature of that site.*

15.145. The purpose of the addition is to ensure the MMO consult with relevant bodies specified by the Secretary of State (such as the SNCBs, TWT and WDC and other bodies responsible for marine activities) if piling is to be used, as requested by TWT and WDC. The Secretary of State considers that this answers TWT and WDC's point raised in their consultation responses of the 19 July 2016 that the present condition gives the MMO a very high degree of discretion as to the mitigation needed to be satisfied of no adverse effect on integrity as the MMO will have to consult with the SNCBs and other relevant bodies before approving the plan. The Secretary of State notes that the management objectives under discussion by NE and JNCC should be used if available.

15.146. The Secretary of State has considered the Applicant's response to the addition of the above provision which noted that although the MMO will be the ultimate approving body under the provisions they will be obliged to consult with different bodies as part of their approval process. The Applicant considers it to be imperative that a situation does not arise whereby the MMO is faced with competing considerations, particularly in relation to offshore health and safety matters. The Applicant considered it prudent in the circumstances to keep the sign off process distinct between the respective provisions to avoid such potential conflict and suggested alterations to the provision accordingly. The Secretary of State also notes that within the Applicant's proposed amendment they suggested removing from the list of potential mitigation 'changing the location of wind turbine generators'. The Applicant noted that in circumstances where alterations to the approved layout of the wind turbine generators was considered necessary to avoid an adverse effect on integrity of the Southern North Sea pSAC, this would remain possible under both the terms of the amended Condition and pursuant to Condition 10(2) and (3) of the draft DMLs, which permits alterations to the approved layout. The Applicant considered that no flexibility would be lost as a result of the proposed amendment; they considered that it simply keeps processes distinct and avoids any scope for unnecessary project delays. The Secretary of State has considered the Applicant's view but considers that mitigation issues (including the location of wind turbine generators) should be considered with other competing considerations, such as health and safety issues, when the plan

referred to in Condition 8(1) is approved and as such has not altered the provision as suggested by the Applicant[67].

15.147. The Secretary of State has considered the TWT response to the addition of the provision. TWT noted that with specific regard to measure (c), although they agree with its inclusion, they consider that further refinement of the text is needed to ensure its correct interpretation. They noted that their understanding is that this measure means that the layout could be designed so that fewer turbines are located within the pSAC and/or that turbines are placed at the greatest possible distance from the pSAC boundary. However, given the strict restrictions on turbine layout, due to navigation and safety requirements, TWT believe this measure should be better described. The Secretary of State has considered this and has added the words "subject to the terms and conditions of this licence" before "changing the location of wind turbine generators" so that it is clear that the requirements of, for example, Condition 1 (design parameters) are not intended to be overridden.

15.148. The Secretary of State has carefully considered the wording and location of the provisions added. Condition 8(6) states that 'the MMO must not approve the plan referred to in paragraph (1) or the Code referred to in paragraph (2) unless the MMO is satisfied…that either the plan or Code (or both of them) provide such mitigation as is necessary to avoid adversely affecting the integrity (within the meaning of the [Offshore Habitats Regulations]) of a relevant site, to the extent that marine mammals are a protected feature of that site'. The Secretary of State has underlined a key element of the provision which is designed to ensure that, where piling takes place, the plan and code referred to provide the mitigation necessary to avoid an adverse effect on integrity. As per the advice of NE and JNCC that a conclusion of 'no adverse effect on integrity can only be reached if the Secretary of State can be 'sure' or make 'certain' that there will be no adverse effects' the Secretary of State is satisfied that the provision ensures this by including a range of mitigation measures and by ensuring that the MMO must consult SNCBs and other relevant bodies including those responsible for other marine activities (as directed by the Secretary of State) before approving plans which include the mitigation to be implemented.

15.149. The Secretary of State notes the concerns highlighted by WDC in their 19 July 2016 response that there is still no guarantee that mitigation measures will be used. WDC noted that they would like to see a commitment to the use of effective mitigation methods, and adequate monitoring. The RSPB noted in their response of the 19 July 2016 that there is no obligation upon the MMO to impose conditions. The response stated that given the information that is currently available the RSPB consider that it is unlikely that it will be possible for works to be consented without a DCO, and therefore question why the application of mitigation provisions is not being made mandatory to ensure that the least potentially disruptive construction techniques are deployed. The Secretary of State considers that the wording of the provision is suitable to ensure that necessary mitigation will be implemented if required. In addition, the DMLs already provide for a plan for marine mammal monitoring.

[67] The mitigation 'changing the location of wind turbine generators' only applies to the DMLs for the generation assets.

15.150. The Secretary of State notes the MMOs requests that if additional mitigation measures are referred to within the provision they should meet stipulated criteria (set out in paragraph 15.117). Any mitigation will be included in the plans and code approved under Condition 8 and will be implemented, enforced and monitored as part of the plans and code. The Secretary of State considers that the provision is adequately defined as drafted and enables a conclusion of no adverse effect to be reached as discussed further below.

15.151. The consultation also noted that the Secretary of State was minded to add words to paragraph (2)(e) of condition 8 of each proposed deemed marine licence. The Secretary of State has included this provision with a slight change as noted in bold below.

(e) in the event that driven or part-driven pile foundations are proposed to be used, a marine mammal mitigation protocol, the intention of which is to prevent injury ***and/or significant*** *disturbance to marine mammals, following current best practice as advised by the statutory nature conservation agencies, which may include, but is not limited to…*

15.152. The Secretary of State has made the slight change as a result of comments received from a number of Interested Parties. The Applicant noted that it did not consider it to be appropriate to specify the prevention of disturbance in such an unqualified manner. The Applicant noted that its HRA recognised that a degree of disturbance to marine mammals is likely to occur, irrespective of the final Project design, but that such disturbance would remain within acceptable limits. The Applicant therefore sought to revise the Secretary of State's suggested drafting to refer to "significant disturbance" and to refer to the definition of 'disturbance' within regulation 39(1)(b) of the Offshore Habitats Regulations. The Secretary of State agrees with these changes. (TWT also suggested that "disturbance" be defined by reference to regulation 39 of the Offshore Habitats Regulations.) NE and JNCC noted general agreement with the additional wording proposed by the Secretary of State to paragraph (2)(e) of condition 8 of each proposed DML but suggested that the wording is replaced with '*injury* ***and*** *disturbance'*. WDC also requested the same addition. TWT also noted that they would like to see further clarification of the additional wording suggested for paragraph (2)(e) of condition 8 of the deemed marine licences. They suggested that it should be 'injury and/or disturbance'. The Secretary of State has accepted this suggestion.

15.153. The MMO noted that they wished to understand the justification behind the additional wording proposed to paragraph (2)(e) of condition 8, as they were content with the drafting of the original wording. The MMO note that the JNCC guidance 'Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise' dated August 2010 explicitly states that it is not to prevent disturbance to marine mammals. The Secretary of State notes that although the JNCC guidance is not aimed at preventing disturbance, the Secretary of State considers that the intention of the MMMP should be to prevent both injury and significant disturbance, since avoiding significant disturbance to harbour porpoise is included in the draft conservation objectives of the pSAC. The Secretary of State notes that JNCC and NE are content with the additional wording.

15.154. NE and JNCC advised that the Secretary of State set out in the Appropriate Assessment the following:

- For each of the mitigation options currently available, or likely to become available in the future, in what way may these result in the avoidance of significant disturbance of the harbour porpoise, and therefore allow the conclusion of 'no adverse effect beyond reasonable scientific doubt'.
- How the Secretary of State envisages mitigation should be agreed and secured in the period between consent (should it be granted) and the commencement of piling

The Secretary of State's assessment of the above issues are set out below.

15.155. The provisions will ensure no adverse effect on integrity as the mitigation measures outlined in the additional provision will:

a) Allow the MMO (following consultation with consultees) to restrict the piling of the project to a season in which harbour porpoise are less reliant on that area of the site (the Project site only overlaps with the summer portion of the pSAC).

b) Allow the MMO (following consultation with consultees) to schedule piling, having regard to previous, ongoing and future piling associated with other offshore developments, based on an updated assessment of cumulative impacts at a time nearer to construction of the project to ensure a realistic assessment of piling impacts (and other activities likely to act in-combination such as seismic surveys). This will ensure that effects on the pSAC can be minimised as it will minimise cumulative exclusion from areas.

c) Allow for a change in the location of wind turbine generators so that fewer turbines are located within the pSAC and/or that turbines are placed at the greatest possible distance from the pSAC boundary.

d) Allow the use of alternative foundation methodologies which do not require piling, such as jacket foundations (suction piles) or gravity base foundations, to avoid the noise impacts which would impact harbour porpoise.

e) Allow the use of noise reduction technologies at source which create a barrier to sound transfer and thereby limit the noise which would impact harbour porpoise.

f) Allow the use of other relevant technologies or methodologies that may emerge in the future. This will ensure that any new technologies or methods that may occur prior to construction can be used during construction of the Project.

15.156. The Secretary of State notes the advice from NE and JNCC that it will be vital that the Applicant accepts stringent requirements to review the need for mitigation and agree with the MMO and consultees a programme of required measures as early as possible, to ensure that they can secure appropriate equipment and installation contracts and ultimately comply with the condition. The Secretary of State considers that early engagement with the MMO and consultees is a crucial element of the provision and advises the Applicant to start these discussions as soon as possible.

15.157. The Secretary of State notes the concerns raised by TWT in paragraph 15.123 above and considers that provisions a-c alone allow a conclusion of no adverse effect on site integrity to be reached as these provisions ensure that piling can only go ahead in seasons of least impact, piling will only occur after consideration and restriction of timing of construction of this Project in relation to other projects and have the capacity to limit the locations of turbines such that fewer turbines are located within the pSAC and/or that turbines are placed at the greatest possible distance from the

pSAC boundary. Provisions d to f provide additional mitigation measures should these be available at the time of construction and could be used such that the implementation of provisions a-c may be limited.

15.158. The Secretary of State has considered the advice of the MMO set out above in paragraph 15.120 but maintains the view that the dML is the most appropriate place for the new condition as the MMMP will be approved by the MMO as will other MMMPs for other offshore wind developments. In addition as the body responsible for the dML for this and other offshore developments the MMO will have greater oversight of works occurring within the offshore area in order to identify suitable timing for construction should this be required.

15.159. The Secretary of State has considered the information received both during the Examination and from consultations after Examination. **The Secretary of State concludes that there will be no adverse effect on integrity of the Southern North Sea pSAC as a result of the Project either alone or in-combination with other plans or projects due to the inclusion of Condition 8 in the dML which secures sufficient mitigation.**

Habitats Regulations Assessment Conclusions

17.1 The Secretary of State has carefully considered all of the information presented before and during the Examination, including the RIES, the ES, representations made by Interested Parties, and the ExA's report itself. He considers that the Project has the potential to have an LSE on 11 European sites when considered alone and in-combination with other plans and projects. These sites are listed below.

- Flamborough and Filey Coast pSPA
- Flamborough Head and Bempton Cliffs SPA
- Forth Islands SPA
- Fowlsheugh SPA
- Humber Estuary SPA
- Humber Estuary Ramsar
- Humber Estuary SAC
- Berwickshire and North Northumberland Coast SAC
- River Derwent SAC
- The Wash and North Norfolk Coast SAC
- Southern North Sea pSAC

17.2 The Secretary of State has undertaken an AA in respect of those 11 European sites' Conservation Objectives to determine whether the Project, either alone or in-combination with other plans and projects, will result in an adverse effect on integrity. The conclusions of each of these AAs are summarised below for each site.

Flamborough and Filey Coast pSPA

i) Black-legged kittiwake:

17.3 A LSE upon the kittiwake interest feature of the FFC pSPA and FHBC SPA was identified because of the potential for the Project, both alone and in-combination with other plans and projects, to increase the risk of collision mortality during the operational phase. The Secretary of State has considered jointly the implications for the kittiwake interest feature at both the FFC pSPA and FHBP SPA in view of the conservation objectives for these sites.

17.4 The Applicant advised that, in order to reduce ornithological collision impacts, in particular on the kittiwake population, there would be a reduction in the project's design envelope.

17.5 Following the commitment to reduction in the design envelope, the Applicant, NE and the ExA concluded no adverse effects on the integrity of the FFC pSPA. The RSPB was unable to rule out adverse effect on integrity.

17.6 The Secretary of State has considered the representations made by the Applicant, NE and the RSPB and the recommendation as made by the ExA and is satisfied that, taking into account the mitigation proposed by the Applicant, the potential increased kittiwake collision mortality as a result of the Project alone and in-combination with other plans and projects, would not represent an adverse effect upon the integrity of the FFC pSPA or the FHBC SPA.

ii) Northern Gannet

17.7 A likely significant effect upon the gannet interest feature of the FFC pSPA was identified because of the potential for the Project, both alone and in-combination with other plans and projects, to lead to collision mortality and displacement.

17.8 The Applicant, NE and the ExA concluded no adverse effects on the integrity of the FFC pSPA. However, the RSPB was unable to rule out adverse effects on integrity.

17.9 The Secretary of State has considered the representations made by the Applicant, NE and the RSPB and the recommendation as made by the ExA. The Secretary of State agrees with the recommendations of the ExA, NE and the Applicant and is satisfied that the potential increased gannet collision mortality and displacement as a result of the Project alone and in-combination with other plans and projects would not represent an adverse effect upon the integrity of the FFC pSPA.

iii) Auk species

17.10 A LSE upon the auk species interest features of the FFC pSPA (guillemot, razorbill and puffin) was identified because of the potential for the Project, both alone and in-combination with other plans and projects, to lead to displacement of these species during the operational phase.

17.11 The Applicant, NE and the ExA concluded no adverse effects on the integrity of the FFC pSPA. However, the RSPB was unable to rule out adverse effects on integrity.

17.12 The Secretary of State has considered the representations made by the Applicant, NE and the RSPB and the recommendation as made by the ExA. The Secretary of State agrees with the recommendations of the ExA, NE and the Applicant and is satisfied that the potential increased auk species displacement mortality as a result of the Project alone and in-combination with other plans and projects would not represent an adverse effect upon the integrity of the FFC pSPA.

iv) Fulmar

17.13 A LSE upon the Fulmar interest feature of the FFC pSPA was identified because of the potential for the Project, both alone and in-combination with other plans and projects, to lead to displacement during the operational phase.

17.14 The Applicant, NE and the ExA concluded no adverse effects on the integrity of the FFC pSPA.

17.15 The Secretary of State twice wrote to Interested Parties during the decision period to seek clarification on figures from the Applicant's Habitats Regulations Assessment Report and request that NE provide clarity on its conclusions. The Applicant, NE and RSPB provided responses on 27 June 2016 and 19 July 2016. The Applicant and NE affirmed that the conclusions arrived at in the

Applicant's original assessments remain valid, and that there is no potential for adverse effect on integrity.

17.16 The Secretary of State has considered the representations made by the Applicant, NE and the RSPB and the overall recommendation as made by the ExA for the FFC pSPA. The Secretary of State agrees with the recommendations of the ExA, NE and the Applicant and is satisfied that the potential increased fulmar displacement mortality as a result of the Project alone and in-combination with other plans and projects would not represent an adverse effect upon the integrity of the FFC pSPA.

Flamborough Head and Bempton Cliffs SPA

17.17 A LSE upon the kittiwake feature of the FHBC SPA and FFC pSPA was identified because of potential for the Project, both alone and in-combination with other plans and projects, to increase the risk of collision mortality during the operational phase.

17.18 The Applicant [REP3-014] and NE [RR-021] both state that their submissions for FFC pSPA apply equally to FHBC SPA. The ExA also advises that its assessment of the effects of the Project, alone and in-combination, on the FFC pSPA, has considered, in detail, all the impacts expected to affect the kittiwake interest feature for FHBC SPA and that it is satisfied that the Project, alone and in-combination with other plans and projects, will not have an adverse effect upon the integrity of the FHBC SPA.

17.19 Given the overlap of the interest feature between the two sites, the Secretary of State considers that there is no requirement to repeat the assessment of the impacts of the Project for the features of the FHBC SPA and that on the basis of the analysis and conclusions reached in section 6, the Secretary of State is satisfied that the Project, when considered both alone and in-combination with other plans and projects, will not have an adverse effect upon the integrity of the FHBC SPA.

Forth Islands SPA

17.20 A LSE upon the Fulmar interest feature of the Forth Islands SPA was identified because of the potential for the Project, both alone and in-combination with other plans and projects, to lead to displacement during the operational phase.

17.21 The Applicant and the ExA concluded no adverse effects on the integrity of the Forth Islands SPA.

17.22 The Secretary of State twice wrote to Interested Parties during the decision period to seek clarification on figures from the Applicant's Habitats Regulations Assessment Report and request that SNH provide clarity on its conclusions. The Applicant and RSPB provided responses on 27 June 2016 and 19 July 2016. SNH also provided a response on 19 July 2016. The Applicant and SNH affirmed that the conclusions arrived at in the Applicant's original assessments remain valid, and that there is no potential for adverse effect on integrity.

17.23 The Secretary of State has considered the representations made by the Applicant, SNH and the RSPB and the overall recommendation as made by the ExA for the Forth Islands SPA. The Secretary of State agrees with the recommendations of the ExA, and the views of SNH and the

Applicant and is satisfied that the potential increased fulmar displacement mortality as a result of the Project alone and in-combination with other plans and projects would not represent an adverse effect upon the integrity of the Forth Islands SPA.

Fowlsheugh SPA

17.24 A LSE upon the Fulmar interest feature of the Fowlsheugh SPA was identified because of the potential for the Project, both alone and in-combination with other plans and projects, to lead to displacement during the operational phase.

17.25 The Applicant and the ExA concluded no adverse effects on the integrity of the Fowlsheugh SPA.

17.26 The Secretary of State twice wrote to Interested Parties during the decision period to seek clarification on figures from the Applicant's Habitats Regulations Assessment Report and request that SNH provide clarity on its conclusions. The Applicant and RSPB provided responses on 27 June 2016 and 19 July 2016. SNH also provided a response on 19 July 2016. The Applicant and SNH affirmed that the conclusions arrived at in the Applicant's original assessments remain valid, and that there is no potential for adverse effect on integrity.

17.27 The Secretary of State has considered the representations made by the Applicant, SNH and the RSPB and the overall recommendation as made by the ExA for the Fowlsheugh SPA. The Secretary of State agrees with the recommendations of the ExA, and the views of SNH and the Applicant and is satisfied that the potential increased fulmar displacement mortality as a result of the Project alone and in-combination with other plans and projects would not represent an adverse effect upon the integrity of the Fowlsheugh SPA.

Humber Estuary SPA and Ramsar

17.28 The Applicant identified a LSE upon the Humber Estuary SPA and Ramsar site because of the potential for construction works, where the export cable comes onshore, to cause disturbance and displacement of waterbird species. NE and the RSPB also considered there to be a LSE because of the potential for operation and maintenance activities to cause disturbance and displacement of waterbird species. The Applicant, NE and the ExA concluded no adverse effects on the integrity of the FFC pSPA, however the RSPB was unable to rule out adverse effect on integrity.

17.29 The Applicant, NE and the ExA concluded no adverse effects on the integrity of the SPA and Ramsar site, however the RSPB was unable to rule out adverse effect on integrity.

17.30 The Secretary of State has considered the representations made by the Applicant, NE and the RSPB and the recommendation as made by the ExA. The Secretary of State agrees with the recommendations of the ExA, and the views of NE and the Applicant and is satisfied that the DCO/DMLs have sufficient safeguards built in place to ensure that the impacts of the Hornsea 2 project, either alone or in-combination with other plans and projects, will not have an adverse effect upon the integrity of the Humber Estuary SPA and Ramsar site.

Humber Estuary SAC

17.31 A LSE upon the Humber Estuary SAC and Ramsar was identified due to temporary disturbance/loss of habitat and increased suspended sediment concentrations and deposition during construction, construction noise impacts and electro-magnetic field related effects during operation and maintenance. The features of the sites potentially affected are Annex I habitats, river lamprey, sea lamprey and grey seal.

17.32 The Applicant, NE and the ExA concluded no adverse effects on the integrity of the Humber Estuary SAC and Ramsar.

17.33 The Secretary of State has considered the representations made by the Applicant, NE and the recommendation as made by the ExA. The Secretary of State agrees with the recommendations of the ExA, and the views of NE and the Applicant and is satisfied that the Project, both alone and in-combination with other plans and projects would not represent an adverse effect upon the integrity of the Humber Estuary SAC and Ramsar.

Berwickshire and North Northumberland Coast SAC

17.34 A LSE was identified on the Berwickshire and North Northumberland Coast SAC due to construction noise affecting grey seal both from the Project alone and in-combination with other plans or projects.

17.35 The Applicant, NE, TWT and the ExA agreed that due to requirements which secure a MMMP and CoCP there will not be an adverse effect on integrity from the Project alone or in-combination with other plans or projects.

17.36 The Secretary of State agrees with the views of the Applicant, NE and the ExA that due to Requirements incorporated in the DCO there will not be an adverse effect on integrity on the grey seal feature of the Berwickshire and North Northumberland Coast SAC, either alone or in-combination with other plans or projects.

River Derwent SAC

17.37 A likely significant effect on the River Derwent SAC was identified due to increased suspended sediment concentrations and deposition during construction of the Project and electro-magnetic field related effects during operation and maintenance of the Project. The features of the site potentially affected are river lamprey and sea lamprey.

17.38 The Applicant concluded there was no adverse effect on site integrity. No Interested Parties raised concerns about this conclusion. The ExA agreed there would be no adverse effect on site integrity.

17.39 The Secretary agrees concludes that there will not be an adverse effect on integrity on the river and sea lamprey features of the River Derwent SAC, either alone or in-combination with other plans or projects.

The Wash and North Norfolk Coast SAC

17.40 A likely significant effect on the Wash and North Norfolk Coast SAC was identified due to construction noise. The features of the site potentially affected are harbour seal.

17.41 The Applicant concluded that significant impacts associated with construction noise are not anticipated to occur on the harbour seal populations of the Wash and North Norfolk Coast SAC, as a result of the Project alone or in-combination with other plans or projects. No Interested Party raised any issues relating to this conclusion. The ExA concluded that there would be no adverse effects on site integrity.

17.42 The Secretary of State agrees with the views of the Applicant and the ExA that there will not be an adverse effect on integrity on the harbour seal feature of the Wash and North Norfolk Coast SAC, either alone or in-combination with other plans or projects.

Southern North Sea SAC

17.43 Since the close of the examination of the Project, Government has launched the consultation into possible Special Areas of Conservation (pSAC) for harbour porpoise: this includes the Southern North Sea pSAC. The consultation ran between 19th January 2016 and 3rd May 2016. The Secretary of State has carried out a number of consultations following the close of the Examination to seek the views of the Applicant, statutory advisers and interested parties on the impacts of the Project on the pSAC.

17.44 A likely significant effect was identified on the Southern North Sea pSAC due to disturbance of harbour porpoise as a result of construction of the project due to piling.

17.45 The Secretary of State has considered the information received both during the Examination and from consultations after Examination. The Secretary of State has concluded that there will be no adverse effect on integrity of the Southern North Sea pSAC as a result of the Project either alone or in-combination due to the inclusion of a condition in the DMLs which secures sufficient mitigation .

17.46 The ExA's conclusion on the position reached at the end of the Examination, including the Applicant's decision to change the minimum size of the WTGs to 6MW, raise the blade tip height to 34.97m above LAT, reduce the rotor diameter to 241.03m, and reduce the maximum number of turbines to 300, was that the Secretary of State should be able to conclude, after making an Appropriate Assessment, that there will be no significant adverse effects on any European site.

17.47 The Secretary of State is confident that, with the mitigation measures in the DCO and DML Conditions, the MMO's functions under the Marine Licences and Part 4 of the Marine and Coastal Access Act 2009 and the Secretary of State's functions under the DCO and Part 2 of the Energy Act 2004, there will be no adverse effect on integrity of any of these sites for the reasons outlined above.

17.48 Mitigation for the Project will be secured and delivered through the DCO within:

Requirements:

- Requirement 7- Code of Construction Practice
- Requirement 24- Intertidal Access Management Plan

DML Conditions

- Condition 8- Pre-construction plans and documentation
- Condition 13- Pre-construction monitoring and surveys
- Condition 14- Construction monitoring
- Condition 16-Offshore decommissioning
- Condition 17- Amendments to approved plans, etc.
- Condition 18- Restrictions in intertidal area and Humber Estuary Special Area of Conservation

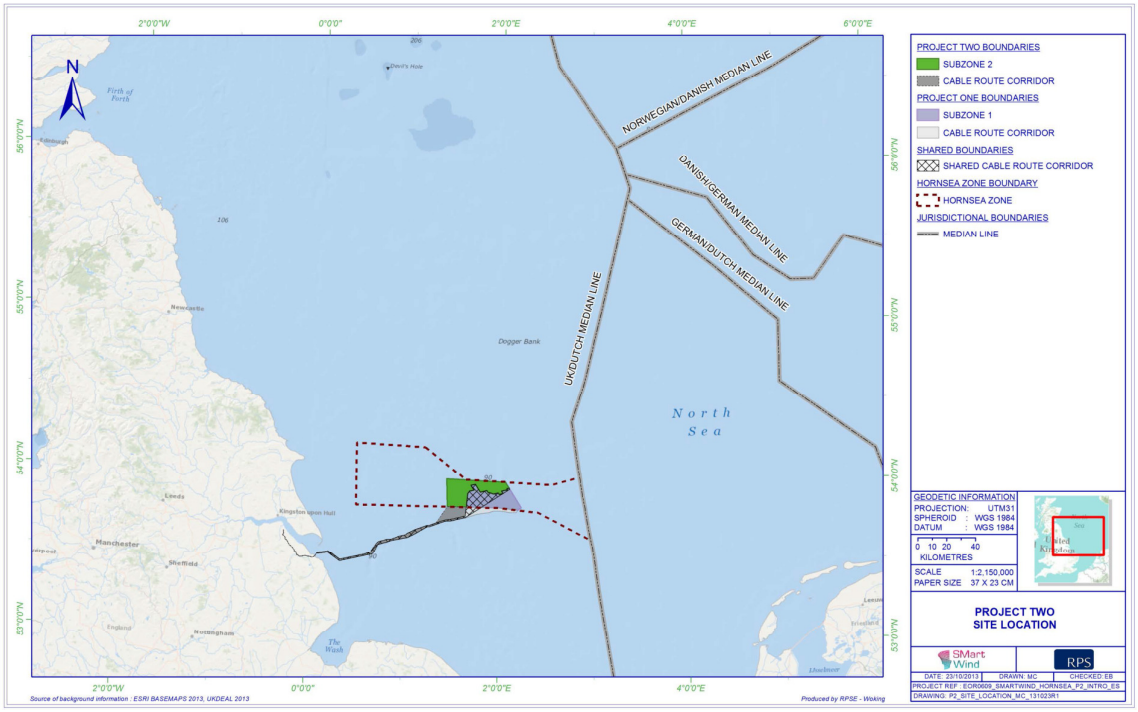
17.43 **The Secretary of State has undertaken a robust assessment using all of the information available to him, not least the advice from the SNCBs, the recommendations of the ExA and the views of Interested Parties including the Applicant. Having considered all of the information available to him and the mitigation measures secured through the DCO and DMLs, the Secretary of State has concluded that the Project will not have an adverse effect on integrity on any European Site, either alone or in-combination with other plans or projects.**

Transboundary Assessment

18.1 Given the potential for this Project to affect mobile features across a wide geographical area; the Secretary of State believes it important to consider the potential impacts on European sites in other European Economic Area ("EEA") states, known as transboundary sites, in further detail. The ExA also considered the implications for these sites, in the context of looking at the wider EIA considerations. The results of the ExA's considerations and the Secretary of State's own views on this matter are presented below.

18.2 The location of the Project in relation to other EEA member states can be seen below in figure 8.

Figure 8: Project location (Smart Wind ES: Annex 4.5.2 Transboundary impacts screening note)



18.3 The distance of the Project from the boundary of the Exclusive Economic Zone (EEZ) or 'median line' of other EEA states considered is presented in Table 27 below.

Table 27: Summary of approximate distance to nearest Exclusive Economic Zone (EEZ) (median line) of other EEA states (Smart Wind ES: Annex 4.5.2 Transboundary impacts screening note).

Exclusive Economic Zone	Distance from the Project to nearest border (km)
The Netherlands	49.3
Germany	202.3
Belgium	223.1
Danish	229.5

Norway	244.9
France	246.1
Iceland	1147.6

18.3 The Applicant identified an extensive list of European sites to be considered. The sites and their features considered can be seen in table 28 below.

Table 28: Transboundary sites considered (adapted from the Applicant's HRA Screening and Integrity matrices).

Special Area of Conservation site	Site features considered	Distance from Project (closest point)
Anse de Vauville SCI	Annex 1 habitat and Annex II marine mammals	519km
Baie de canche et couloir des trois estuaires SCI	Migratory fish, Annex 1 habitat and Annex II marine mammals	362km
Baie de Seine occidentale SCI	Migratory fish, Annex 1 habitat and Annex II marine mammals	502km
Bancs des Flandres pSCI	Annex 1 habitat and Annex II marine mammals	282km
Banc et rècifs de Surtainville SCI	Annex 1 habitat and Annex II marine mammals	535km
Borkum – Riffgrund SCI	Migratory fish, Annex 1 habitat and Annex II marine mammals	262km
Doggerbank (German Dogger Bank) SCI	Annex 1 habitat and Annex II marine mammals	63 km
Doggersbank pSCI	Annex 1 habitat and Annex II marine mammals	63km
Dråby Vig SAC	Migratory fish, Annex 1 habitat and Annex II marine mammals	533km
Estuaire de la Seine SCI	Migratory fish, Annex 1 habitat and Annex II marine mammals	488km
Estuaires et Littoral Picards (baies de Somme et d'Authie) SAC	Migratory fish, Annex 1 habitat and Annex II marine mammals	383km
Falaises du Cran aux oeufs et du cap gris-nez, dunes du chatelet, marais de tardinghen et dunes de wissant SCI	Annex 1 habitat and Annex II marine mammals	326km
Gule Rev pSCI	Annex 1 habitat and Annex II marine mammals	516km
Hamburgisches Wattenmeer SAC	Migratory fish, Annex 1 habitat and Annex II marine mammals	401km
Helgoland mit Helgoländer Felssockel SAC	Annex 1 habitat and Annex II marine mammals	374km
Klaverbank SCI	Annex 1 habitat and Annex II marine mammals	50km
Løgstør Bredning, Vejlerne og Bulbjerg SAC	Migratory fish, Annex 1 habitat and Annex II marine mammals	540km
Nationalpark Niedersächsisches Wattenmeer SCI	Migratory fish, Annex 1 habitat and Annex II marine mammals	296km
Noordzeekustzone SAC	Migratory fish, Annex 1 habitat and Annex II marine mammals	192km
Noordzeekustzone II pSCI	Migratory fish, Annex 1 habitat and Annex II marine mammals	192km
NTP S-H Wattenmeer und	Migratory fish, Annex 1 habitat	388km

angrenzende Küstengebiete SCI	and Annex II marine mammals	
Östliche Deutsche Bucht SCI	Migratory fish, Annex 1 habitat and Annex II marine mammals	351km
Rècifs et landes de la Hague SCI	Annex 1 habitat and Annex II marine mammals	508km
Récifs et marais arrière-littoraux du Cap Lévi à la Pointe de Saire SCI	Annex 1 habitat and Annex II marine mammals	490km
Récifs Gris-Nez Blanc-Nez SCI	Annex 1 habitat and Annex II marine mammals	315km
Ridens et dunes hydrauliques du detroit du pas-de-calais pSCI	Annex 1 habitat and Annex II marine mammals	320km
SBZ 1/ ZPS 1 SCI	Migratory fish, Annex 1 habitat and Annex II marine mammals	298km
SBZ 2/ ZPS 2 SCI	Migratory fish, Annex 1 habitat and Annex II marine mammals	287km
SBZ 3/ ZPS 3 SCI	Migratory fish, Annex 1 habitat and Annex II marine mammals	290km
Steingrund SAC	Annex 1 habitat and Annex II marine mammals	385km
Sylter Außenriff SCI	Migratory fish, Annex 1 habitat and Annex II marine mammals	295km
Sydlige Nordsø SAC	Annex 1 habitat and Annex II marine mammals	349km
Unterelbe SCI	Migratory fish and Annex II marine mammals	433km
Vadehavet med Ribe Å, Tved Å og Varde Å vest for Varde SAC	Migratory fish, Annex 1 habitat and Annex II marine mammals	418km
Venø, Venø Sund SAC	Migratory fish, Annex 1 habitat and Annex II marine mammals	501km
Vlakte van de Raan pSCI	Migratory fish, Annex 1 habitat and Annex II marine mammals	274km
Vlakte van de Raan SAC	Migratory fish, Annex 1 habitat and Annex II marine mammals	275km
Waddenzee SAC	Migratory fish, Annex 1 habitat and Annex II marine mammals	199km

18.1 The transboundary sites and the interest features considered to be at risk from the Project were mostly several hundreds of kilometres away from the location of the proposed Project, the exception being sites in the Netherlands' and German waters (Doggersbank pSCI, Klaverbank SCI and Doggerbank pSCI). There were only three interest features found by the Applicant to have a potential LSE at all of these sites, these were grey seal, harbour seal and harbour porpoise (marine mammals).

18.1 The Applicant identified the potential for transboundary impacts upon marine mammals due to the mobile nature of marine mammal species and the proximity of the Project to the border of other EEA states. The Applicant identified that direct impacts may occur due to underwater noise generated during construction and decommissioning, particularly construction piling during the installation of foundations. Indirect impacts may cause disturbance to prey (fish) species from loss of fish spawning and nursery habitat and suspended sediments and deposition. The Applicant's HRA notes that construction noise associated with piling activity during construction was the potential impact requiring further assessment in relation to Annex II marine mammal features. The specific impacts likely to affect marine mammals are discussed in earlier chapters of this HRA.

18.2 The ExA report notes that under regulation 24 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (EIA Regulations) the Secretary of State for the Department for Communities and Local Government undertook two screenings. The first was undertaken on 25 January 2013 following the Applicant's request for a scoping opinion. The ExA report notes that the Secretary of State concluded that significant effects were likely on the environment of 7 EEA states listed below. This was with regard to potential impacts on Natura 2000 sites.

- Netherlands
- Denmark
- Germany
- Iceland
- France
- Belgium
- Norway

18.3 The Government of the Netherlands responded confirming that it wished to take part in the Examination process.

18.4 Following the submission of the Application the Secretary of State for the Department for Communities and Local Government rescreened the Project. The Applicant's HRA report considered potential adverse effects on the integrity of the Natura 2000 sites listed in table 28 above. No adverse effects on integrity of these sites were identified. The Secretary of State concluded that there could be significant effects on the environment of the EEA sites identified above in relation to both marine mammals (which could be qualifying features of Natura 2000 sites) and bird species (which could be qualifying features of Natura 2000 sites).

18.5 In reaching this view the ExA report notes that the Secretary of State for the Department for Communities and Local Government applied the precautionary approach. The states that did not respond to the previous regulation 24 notification were renotified. A consultation letter was sent to the Netherlands.

18.6 The ExA report notes that the inspectorate wrote to all of the EEA states listed above to offer them 'other person' status in the Examination. The Danish authorities responded confirming that they wished to participate under the Espoo Convention and stating the relevant Danish authorities would respond by the 15 July 2015 if they had any comments to make [REP1-009]. The Danish Nature Agency then confirmed in an email dated 7 July 2015 that they had no comments [REP1-08]. The ExA report notes that no other states responded.

18.7 The ExA report notes that the ExA had regard to responses received, and also of the ongoing duty to have regard to transboundary matters, throughout the Examination. The ExA concluded that they are satisfied that with regard to regulation 7 of the Infrastructure Planning

(Decisions) Regulations 2010, all transboundary environmental matters have been addressed and there are no matters outstanding that would argue against the Order being confirmed.

18.8 The Secretary of State has considered the information provided by the Applicant during the Examination and notes the distance between the Project and designated sites of other EEA states (the closest being 50km away). The Secretary of States notes the Applicant's conclusion of no adverse effect on integrity for any non-UK European site. The Secretary of State has considered the potential effects from the Project at UK sites which are closer than Natura 2000 sites in other EEA states. As noted in earlier sections the Secretary of State has reached a conclusion of no adverse effect on the Southern North Sea pSAC and all other UK European sites due to mitigation secured within the DCO and dMLs for the Project. The Secretary of State therefore considers that there will not be adverse effects on integrity of Natura 2000 sites in other EEA states as a result of the Project due to the distance between the Project and non-UK Natura 2000 sites and adequate mitigation being secured.

Conclusions

18.9 The Secretary of State has considered the potential for the Project to affect transboundary European sites in Germany, the Netherlands, Belgium, Denmark, Iceland, France and Norway. Those sites support harbour porpoises, harbour seal and grey seal.

18.10 The Secretary of State has considered all of the information available, particularly noting the lack of objections from any of the EEA states potentially affected by the development and the recommendation made by the ExA. The ExA's report notes that whilst the Applicant identified potential impacts on European sites outside the UK or UK waters in other EEA states, no evidence was submitted to the examination of any specific adverse effects on the integrity of these sites, either from the EEA States where the European sites are located or interested parties.

18.11 **The Secretary of State is satisfied that the Project, either alone or in-combination with other plans or projects, will not adversely effect the integrity of any of the transboundary European sites.**

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Date: **15th August, 2016**

References

- Department of Environment Food and Rural Affairs. 2013. Report of the Triennial Review of the Joint Nature Conservation Committee.
- Department of Environment Food and Rural Affairs. 2013. Triennial Review of the Environment Agency and Natural England.
- English Nature. 1997. Habitats regulations guidance note 1.
- The Habitats Regulations Handbook, (September) 2013. www.dtapublications.co.uk DTA Publications Limited.
- Natural England, 2015 (NE, 2015) http://publications.naturalengland.org.uk/publication/5511099672690688 accessed 03/05/16
- English Nature and Environment Agency (2003). *North Norfolk Coast Coastal Habitat Management Plan Final Report.*
- European Site Conservation Objectives for Berwickshire and North Northumberland Coast SAC, Natural England 2016, http://publications.naturalengland.org.uk/publication/5920077534724096 Accessed 10/06/2016
- European Site Conservation Objectives for Humber Estuary SAC, Natural England 2014, http://publications.naturalengland.org.uk/publication/5009545743040512?category=6071598712881152 Accessed 31/05/2016
- European Site Conservation Objectives for The Wash and North Norfolk Coast European SAC, http://publications.naturalengland.org.uk/publication/5950176598425600 Accessed 10/06/2016
- European Site Conservation Objectives: Draft Supplementary Advice on Conserving and Restoring Site Features http://publications.naturalengland.org.uk/publication/4824082210095104 Accessed 02/06/2016
- Furness, R.W., Wade, H.M. and Masden, E.A. (2013). Assessing vulnerability of marine bird populations to offshore wind farms. Journal of Environmental Management, 119, pp. 56-66.
- JNCC Berwickshire and North Northumberland SAC http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0017072 Accessed 10/06/2016
- JNCC River Derwent SAC http://jncc.defra.gov.uk/ProtectedSites/SACselection/sac.asp?EUCode=UK0030253 Accessed 02/06/2016
- JNCC The Wash and North Norfolk Coast SAC http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0017075 Accessed 10/06/2016

- MacArthur Green (2014) Biologically appropriate, species-specific, geographic non-breeding season population estimates for seabirds. Report for Natural England and Marine Scotland.
- Southall, B. Southall, A. E., Bowles, W., Ellison, T., Finneran, J.J., Gentry, R. L., Greene Jr. C. R., Kastak, D., Ketten, D.R., Miller, J. H., Nachtigall, P. E., Richardson, W. J., Thomas, J. A., Tyack, P. L. 2007. Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations. Aquatic Mammals, Volume 33, Number 4.
- Thompson, D., and Duck, C. (2010). Berwickshire and North Northumberland Coast European Marine Site: grey seal population status, Report to Natural England: 1 - 38.
- Thompson, P., Hastie, G., Nedwell, J., Barham, R., Brooker, A., Brookes, K., Cordes, L., Bailey, H., and McLean, N. (2011). Framework for assessing the impacts of pile driving noise from offshore wind farm construction on Moray Firth harbour seal populations. Report to support two offshore wind farms applications in the Moray Firth, on behalf of BOWL and MORL.