Department of Energy & Climate Change

RECORD OF THE HABITATS REGULATIONS ASSESSMENT UNDERTAKEN UNDER REGULATION 61 OF THE CONSERVATION OF HABITATS AND SPECIES REGULATIONS 2010 (AS AMENDED) AND REGULATION 25 OF THE OFFSHORE HABITATS REGULATIONS FOR AN APPLICATION UNDER THE PLANNING ACT 2008 (AS AMENDED)

This report includes a transboundary assessment of impacts

***Project Title*: Dogger Bank Creyke Beck Offshore Wind Farm**

Date: **17th February 2015**

CONTENTS

Introduction

Background

1.0 This is a record of the Habitats Regulation Assessment (HRA) that the Secretary of State (SoS) for Energy and Climate Change has undertaken under the Conservation of Habitats and Species Regulations 2010 (as amended) (the Habitats Regulations) and the Offshore Marine Conservation (Natural Habitats & c.) Regulations 2007 (as amended) (the Offshore Habitats Regulations) in respect of the Development Consent Order (DCO) and Deemed Marine Licence (DML) for the proposed Dogger Bank Creyke Beck Offshore Wind Farm and its associated infrastructure (the 'Project'). For the purposes of these Regulations the SoS 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 Union Member States ("transboundary sites"). This is included under the transboundary assessment section of the report.

1.2 Forewind Limited ("the Applicant") has applied to the SoS for a Development Consent Order (DCO) under Section 37 of the Planning Act 2008 (as amended) for the construction and operation of two offshore wind farm each with a capacity of up to 1.2 GW, and their associated offshore and onshore infrastructure. The wind turbine array would cover an area of 1,114km^2; the proposed Project is within the North Sea approximately 131km from the Holderness coast. The proposed Project comprises the construction and operation of up to 400 three bladed, horizontal axis wind turbines and a network of subsea inter-array cables, together with associated development offshore (offshore converter and collector platforms, meteorological masts, accommodation or helicopter platforms and connection works of export cable systems) and onshore associate development (onshore export cable systems; converter stations; and associated temporary work). The Project application is described in more detail in Section 2.

1.3 In England and Wales, offshore energy generating stations with a capacity greater than 100 MW constitute nationally significant infrastructure projects (NSIPs) and applications for consent are subject to the requirements of the Planning Act 2008 (as amended). This Project constitutes an NSIP as it has a generation capacity of 2.4 GW (each wind farm is up to 1.2 GW).

1.4 The Project was accepted by the Planning Inspectorate (PINS) on 25th September 2013 and a three-member Panel of Inspectors ("the Panel") was appointed as the Examining Authority (ExA) for the application. The examination of the Project application began on 18th February 2014 and completed on 18th August 2014. The Panel submitted its report of the examination, including its recommendation ("the Panel's Report"), to the SoS on 17th November 2014.

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

Habitats Regulation 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. A Site of Community Importance (SCI) is a site in the process of receiving approval, it has received approval by the European Commission (EC) and will be a SCI until the site has been formally designated as a SAC by UK Government.

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 give consent, permission or other authorisation for, a plan or project which is likely to have a significant effect on a European site (either alone or in combination) and which is not directly connected with or necessary to the management of the site, the competent authority must make an appropriate assessment of the implications for the site in view of the site's conservation objectives.*

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

> *…..before deciding to give consent, permission or other authorisation for, a plan or project which 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 and which is likely to have a significant effect on a European marine site (either alone or in combination) and which is not directly connected with or necessary to the management of the site, the competent*

authority must make an appropriate assessment of the implications for the site in view of the 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 require that, where the project is likely to have a significant effect (LSE) on any such site, an appropriate assessment (AA) is carried out to determine whether or not the project will adversely affect the integrity of the site in view of its Conservation Objectives. In this document, the assessments as to whether there are LSEs, and, where required, the AAs, are collectively referred to as the HRA.

1.13 The HRA takes account of mitigation measures which are secured by requirements and conditions within both the DCO and DML.

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

- The Planning Act 2008 (as amended) Dogger Bank Creyke Beck Offshore Wind Farm Examining Authority's Report of Findings and Conclusions and Recommendations to the SoS for Energy and Climate Change. 17 November 2014 the "**Panel's report**".
- Report on the Implications for European Sites Proposed Dogger Bank Creyke Beck Offshore Wind Farm. An examining authority report prepared with the support of the environmental services team, 14th July 2014 – termed **"the RIES"**.
- Forewind's Environmental Statement, 25th June 2013 – termed **"the ES"**.
- Forewind's HRA Screening Report, 20th August 2013.
- Forewind's Information for Appropriate Assessment Report, 20th August 2013 – termed **"IfAA report".**
- Forewind's HRA integrity matrices, 23rd August 2013.
- Joint Nature Conservation Committee's and Natural England's relevant representations in respect of Dogger Bank (creyke beck) offshore wind farm, 8th November 2013.
- Statement of Common Ground between Forewind and Natural England and JNCC (offshore), 28th February 2014.
- Written representations of Natural England, 17th March 2014.
- Forewind's Responses to the Examining Authority's First Written Questions – Question 40 Appendix 1 – Option 2 collision risk summary tables and apportioning tables, 18th March 2014.
- Environment Agency letter dated 2nd April 2014 regarding the HRA.
- Comments by RSPB on Table 4 of the Examining Authority's Agenda for the first issue specific hearing on biodiversity, biological environment and ecology, and Habitats Regulations Assessment, 4th April 2014.
- Natural England's Appendix C: Tables identifying areas of agreement and disagreement, 11th April 2014.
- Natural England's Interested Parties Deadline IV submission, 19th May 2014.

- RSPB answers to second written questions, 19th May 2014.
- Natural England's Supplementary Ornithological Expert Report, 27th June 2014.
- Forewind's Appendix 5 – Final kittiwake in-combination tables for Farne Islands SPA, 3rd July 2014.
- Natural England's written response to deadline V, 16th June 2014.
- Natural England's written summary of the oral case put by Natural England at the hearing on the specific issues relating to the Habitats Regulations Assessment deadline VI (including Annex 1 final Supplementary Ornithological Expert Report), 7th July 2014.
- Natural England's written response to deadline VIII, 17th July 2014.
- Forewind's comments on Report on the Implications for European Sites, 5th August 2014.
- Natural England's Interested Parties Deadline IX submission (including comments on the RIES), 5th August 2014.

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 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 SCNB beyond 12 nm however this duty has been discharged to NE following the 2013 Triennial Review of both organisations (Defra, 2013). However, JNCC retains responsibility as the statutory advisors for European Protected sites that are located outside the territorial sea and UK internal waters (i.e. more than 12 nautical miles offshore), in this instance the Dogger Bank Site of Community Importance (SCI) and as such continues to provide advice to NE on the significance of any potential impacts on interest features of the site.

1.18 The ExA, with support from the Planning Inspectorate (PINS), prepared a Report on the Implications for European Sites (RIES), based on working matrices prepared by the Applicant. The RIES documented the information received during the examination and presented the ExA's understanding of the main facts regarding the HRA to be carried out by the SoS.

1.19 The RIES was published on PINS planning portal website and circulated to interested parties on 14th July 2014 for a period of 21 days for the purposes of statutory consultation. The RIES, and the written responses to it, have been taken into account in this assessment. There were responses to the RIES consultation from the Applicant and NE.

1.20 The SoS is content to accept the ExA's recommendation that the RIES, and written responses to it, represents an adequate body of information to enable the SoS to fulfil his duties in respect of European sites and species.

Development Description

2.0 The Dogger Bank zone is located in the North Sea off the east coast of Yorkshire. The Project will be roughly 130 kilometres offshore and export cables for both projects would run to a landfall north of Ulrome on the Holderness coast in the East Riding of Yorkshire (Panel's report). From the landfall, underground HVDC cables would continue to the proposed convertor stations south of Beverley from where underground HVAC cables would connect to the existing nearby Creyke Beck substation.

2.1 Some offshore elements of the project would be within the Dogger Bank Site of Community Importance (SCI) and candidate SAC but no other part of the area within the Order limits would adjoin, or be within, any other European site. Dogger Bank has received approval as a SCI by the European Commission (EC) and will be a SCI until the site has been formally designated as a SAC by UK Government. However, the proposal would be ecologically connected to European sites some distance away that provide habitat for species that might be affected by the Project. This includes sites outside the UK, The Doggersbank SCI, Klaverbank SCI in the Netherlands are 35km and 65km respectively from the Project and Doggerbank SCI is 105km away in German waters.

Development Components

2.2 The offshore array is proposed to cover approximately 1,114 km^2, with a maximum installed capacity of 2.4GW and up to 400 wind turbines. The Project's offshore works is divided in half for the purposes of the DCO and these are called Project A and Project B. The offshore components of the Project include:

- Up to 400 wind turbines generators (200 in Project A and 200 in Project B);
- Turbine monopile, multi-leg or gravity-based foundations;
- Offshore inter-array cables between the turbines and the substations;
- Offshore collector and converter stations;
- Offshore operations and maintenance infrastructure, such as accommodation platforms, moorings, and navigational buoys;
- Offshore meteorological data masts and metocean equipment;
- Associated foundations and scour protection measures;
- Export cabling, carrying power from the High Voltage Direct Current (HVDC) converter station(s) of the wind farm(s) to the onshore grid infrastructure, or possibly to other wind farm projects within the Dogger Bank Zone;
- Crossing structures at the points where project cables cross existing cables and pipelines; and structures for the protection of cables, where sufficient burial is not achieved.
- Two onshore substations;
- Two cable systems connecting to the substations and then from the substations to the onshore Grid Electricity Transmission substation.

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

Rochdale Envelope

2.4 In this Project the Applicant has adopted a 'Rochdale Envelope' approach within their Environmental Statement (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.

2.5 In this case, the Applicant has left flexibility in the design of the wind farm components (such as foundation type, wind turbine type and rated capacity, number of export cables and the arrangement of the onshore converter station); and the construction process (such as transportation methods and component installation techniques). The Applicant has sought to retain flexibility in the final project design to enable them to ability to place contracts and build out the project in the most appropriate manner and the DCO has been framed to allow for multiple design options in accordance with the Rochdale Envelope concept. The ES sets out these multiple options for a number of project components including indicative specifications e.g. maximum number of turbines is 400; maximum height 315m; no less than 700m between turbines etc.

2.6 The ES is therefore 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

2.7 The precise construction programme and sequence of works was not known by the Applicant during the examination. From the Applicant's Information for the Appropriate Assessment report (IfAA) the onshore construction period is estimated to be up to 36 months duration for each of the two projects Creyke Beck A and Creyke Beck B. During construction, there will be a requirement for temporary construction compounds, laydown areas, spoil heaps and access tracks. Within the DCO, the following construction options have been maintained for Creyke Beck A and Creyke Beck B in order to provide sufficient flexibility in the programme (from the Applicant's response to the Marine Management Organisation's relevant representation):

- The two projects may be constructed at the same time, or at different times;
- if built at different times, either project could be built first;
- if built at different times, the duration of the gap between the end of the first project to be built, and the start of the second project to be built may vary from overlapping, to up to 2.5 years;
- offshore construction will commence no sooner that 18 months post consent, but must start within seven years of consent (which is the timeframe captured within the draft DCO); and
- assuming a maximum construction period per project of six years, and taking the above into account, the maximum construction period over which the construction for the two projects could take place is 11 years and six months.

Operation and Maintenance

2.8 Once operational, the Applicant discussed in their IfAA report that it will require regular inspections, service and maintenance throughout its lifetime. This will require a dedicated team of technicians and associated support staff. There are a number of approaches to the operation and maintenance of the wind farm and the final solution will be determined following consideration of factors, such as health and safety issues, transit duration, port location and facilities, weather downtime, turbine selection and the cost-benefit analysis of each option. Given the distance of the Project from shore, it is assumed that, in addition to an onshore base at a suitable port, one or more offshore operations hubs will also be required. The offshore hub could be either a fixed platform at the site (standalone, or associated with one of the substation platforms), or medium to large vessels which are able to travel between port and the project areas. Transport to the offshore areas could be by various means, including some combination of small, medium or large vessels, jack-up vessels and helicopters.

2.9 The proposed transport to the Project will determine if there needs to be a number of pre-installed moorings at intervals around the Project areas to allow vessels to moor while work is ongoing.

Offshore Decommissioning

2.10 Decommissioning for the offshore elements of the project is regulated under the Energy Act 2004. Broadly speaking, under the Act, the SoS 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 SoS can approve, modify or reject a decommissioning programme at any point. 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 increase or decrease in importance 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 statutory nature conservation bodies). The decommissioning programme is

included as Requirement 10 within the DCO for this project. Article 11 of the DCO also allows the SoS to require the restoration of the offshore works in the case of abandonment, decay or removal.

2.11 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 SoS 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

3.0 The Dogger Bank Zone is located in the North Sea off the east coast of Yorkshire, as can be seen in *Figure 1*. It is the largest of the UK's Round 3 offshore wind zones, with its outer limit broadly coincident with the UK continental shelf limit, as defined by the UK Hydrographic Office. The Applicant has proposed a Project made up of two offshore wind farm arrays within the Dogger Bank zone, each with a capacity of up to 1.2GW (a total potential of up to 2.4GW) and their associated infrastructure. A map of the array and offshore export cable is given at below.

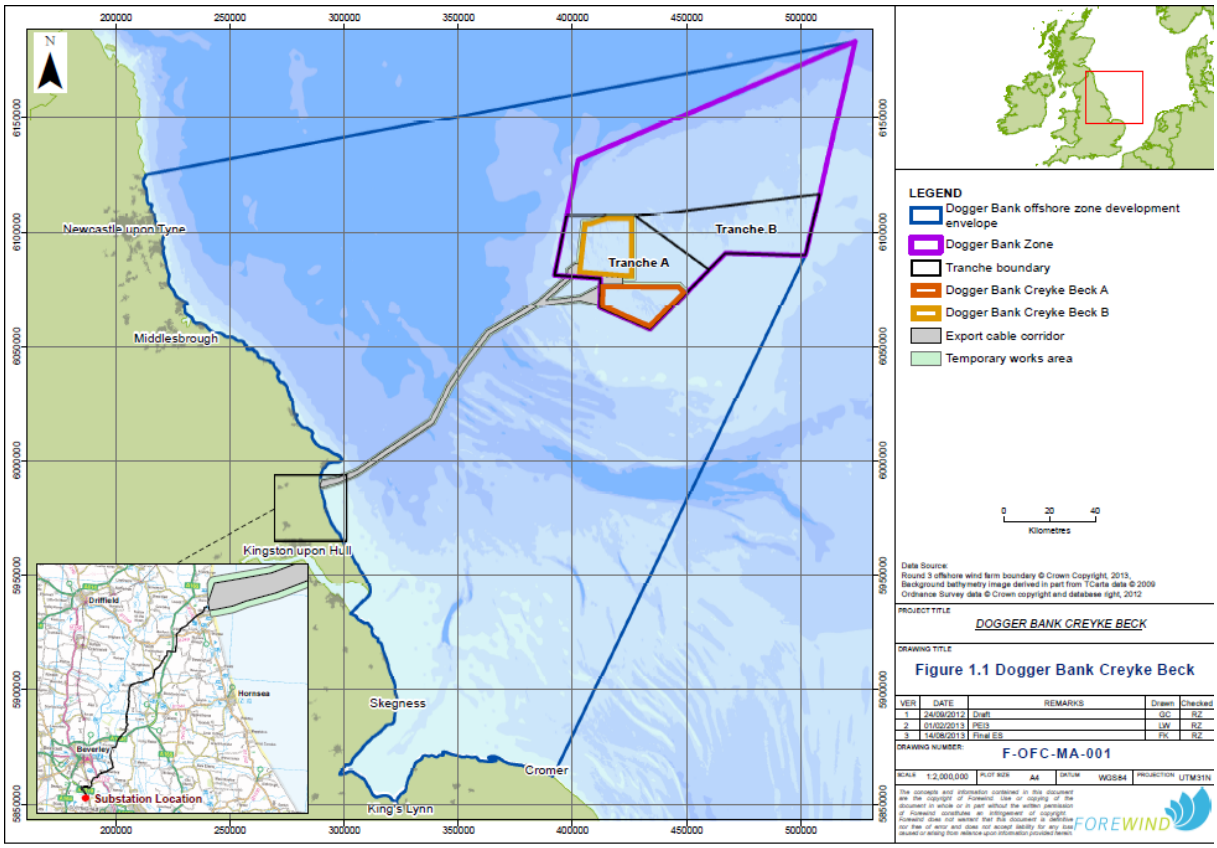


Figure 1 Map of Dogger Bank Offshore wind farm site and cable corridor (from the Applicant's ES)

European and International Sites

3.1 The applicant identified 199 European sites to be considered during the examination. This was a very precautionary approach, as many of the sites were at some considerable distance from the proposed Project and where there was only a slim possibility of an impact. The RIES lists these sites and whether or not the Applicant's conclusion for no likely significant effect or adverse effect was disputed by any interested party, including NE and the RSPB. There is significant overlap between SPA and Ramsar designations, so for the purposes of this assessment; the Ramsar designations are considered in parallel with the SPA designation as all relevant species are covered by both designations.

3.2 The UK sites listed below were included in the RIES LSE screening matrices.

- Dogger Bank cSAC and SCI
- Farne Islands SPA
- Flamborough Head and Bempton Cliffs SPA
- Flamborough and Filey Coast pSPA
- Forth Islands SPA

3.3 The RIES also identified the potential for the Project to affect an extensive number of European sites located in other countries, known as "transboundary sites". There were:

- 27 sites in Germany,
- 33 in the Netherlands,
- 6 in Belgium,
- 32 in Denmark,
- 28 in Sweden,
- 22 in France, and
- 2 in Norway.

The potential impacts upon these sites are considered in more detail within the transboundary section of this report (section 12.0). The main features of concern were marine mammals and Sandbanks which are slightly covered by sea water all the time.

3.4 Following agreement between NE, RSPB and the Applicant, the ExA decided to focus the RIES on only those sites where an LSE could not be excluded, rather than reproducing detailed LSE matrices for all sites where there were no concerns (agreed in the HRA issue specific hearing on the 4th April 2014 and written responses to questions following this hearing). NE confirms that the features that were the focus throughout the examination are the only ones which there were any on-going concerns. Hence, if a feature was not mentioned by NE, then NE were content with the Applicant's conclusions regarding potential impacts on that feature.

3.5 The SoS agrees with this pragmatic approach to focus on the key concerns, given the large number of sites and features. For reference, all sites for which a possible LSE was identified are listed in Annex A. The main body of this report assesses only those sites where there were disputes during the examination about LSEs or adverse effects.

3.6 The Applicant, in its IfAA report and matrices, provides explanations as to why LSEs were excluded for the other sites and reasoning behind decisions of no adverse effect and the SoS relies on these undisputed findings in his conclusions for those sites.

3.7 The RIES lists all the European sites identified by the Applicant and considered during the examination (Annex A of this report). The SoS is satisfied with the decision to exclude an LSE or no adverse effect from the other sites listed within columns 1-4 and has adopted these conclusions for the purposes of the HRA. During the examination the ExA proposes to focus the remainder of the examination on the following European sites listed in *Table 1*. This approach was agreed to by NE and the RSPB.

3.8 The study area for the Project was assessed by the Applicant as either the works area, buffer area and a wider area to reflect the spatial scope of potential effects on the European site's features i.e.

- annex I habitat – works area plus buffer zone;
- fish;
- marine mammals;
- passage and over-wintering birds – works area plus 4km buffer zone;
- breeding seabird colonies – the zone of influence for seabirds during the breeding season is defined by the mean maximum foraging range from the colony (using values from Thaxter et al. 2012).

3.9 The Applicant and NE provided comments on the RIES. No other consultee responded to the RIES or disagreed with its approach.

Likely Significant Effects Test

4.0 Under Regulation 61 of the Habitats Regulations, the SoS must consider whether a development will have a likely significant effect (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 SoS's conclusions on the need for an AA and his reasons for screening 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 SoS 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 (listed in Annex A) to determine whether or not there will be an LSE. Where there are predicted LSE*s* and the Applicant's conclusion of no adverse effect was disputed these sites are described briefly in *Table 1*. All other sites from the RIES where there are predicted LSEs but the Applicant's conclusions of impact was not disputed are listed within Annex A of this report. Further details are set out in the Applicant's IfAA report and HRA Screening Report.

Likely Significant Effects

4.3 The RIES sets out the potential impacts of each stage of the Project and describes if these could impact on a European site's features. The RIES also describes potential impacts from this project on the European sites identified within the Applicant's HRA. For birds, this includes impacts such as disturbance/ displacement from vessel movement and pile driving impacting on prey species during construction of the project. During operation of the wind turbines, there could also be displacement of birds from the wind farm site, direct collision with the turbines and potential for the wind farm to cause a barrier to the movement of migrating birds. They also found direct impacts on sandbanks from construction and operation of the wind turbines as they are located on this habitat, as well as the cabling that runs between the turbines, collector and convertor stations and the onshore substations.

4.4 Decommissioning impacts are not considered further within this report for the reasons discussed within section 2. Paragraph 6.18 is the only excepted case where decommissioning of the offshore elements of the Project is referred to in relation to proposed mitigation and restoration of habitat.

4.5 The SoS considers that LSEs could not be ruled out for the following features: sandbanks which are slightly covered by sea water all the time, gannets, kittiwake, guillemot, razorbill, fulmar and puffin as a result of the Project alone and in combination with other plans and projects. These are features of five European sites which may be affected.

4.6 The full list of the SPAs and Ramsar Sites, together with the designated populations for which a potential LSE has been determined is provided in Section 3 of the Applicant's IfAA report.

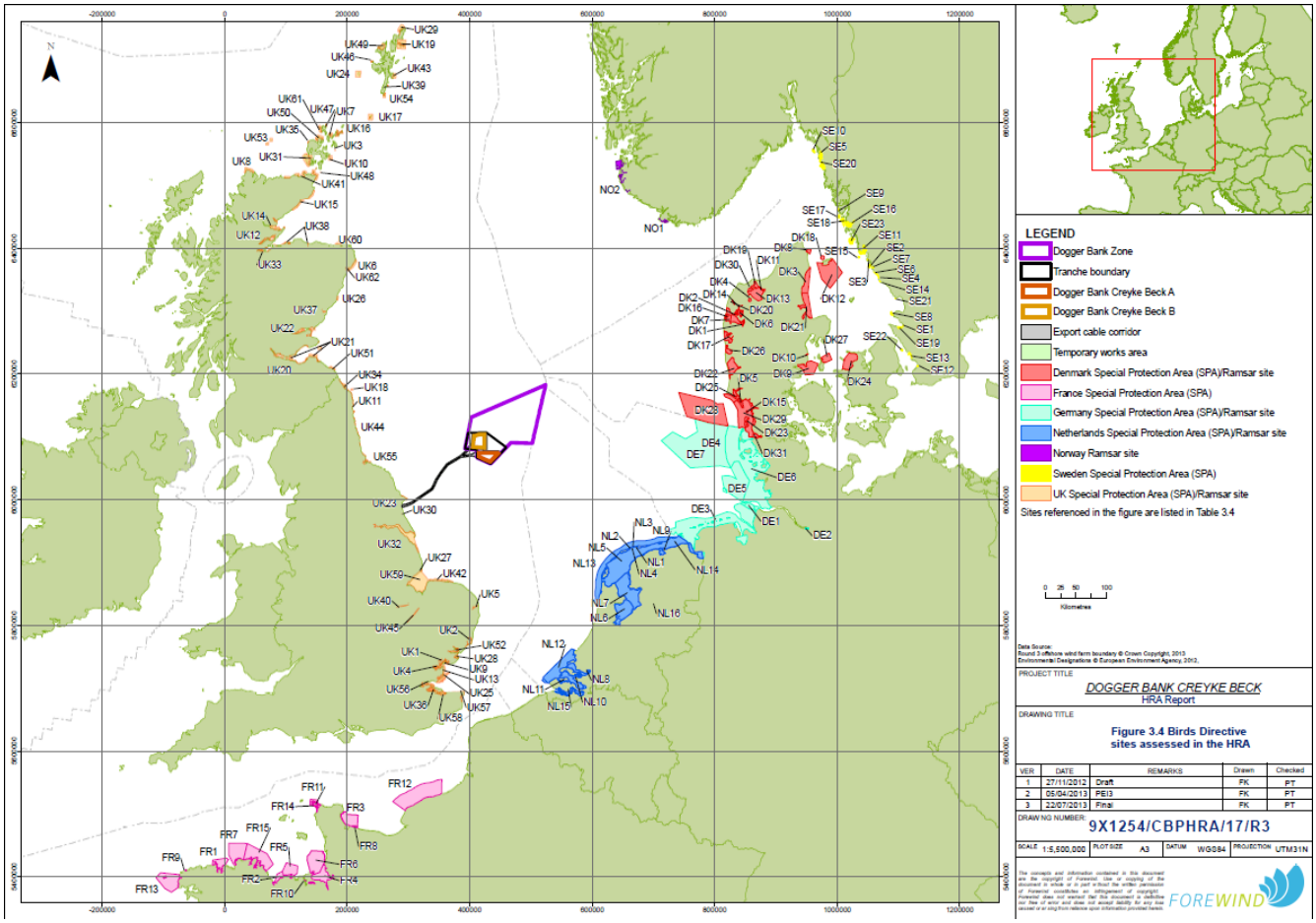


Figure 2 the Birds Directive sites assessed in the HRA

4.7 LSE's could not be ruled out for the sites and features shown in *Table 1* and have been taken forward to the AA. The information within the RIES present the potential interactions of each stage of the Project (construction, operation, decommissioning) with the qualifying features of those 5 sites listed in *Table 1*. The SoS agrees with the ExA that, LSEs cannot be excluded from the 5 sites identified in *Table 1* when the Project is considered alone and in combination with other plans and projects (these are set out in *Table 2*).

Table 1 Sites in the RIES where an LSE could not be ruled out and the Applicant's conclusion of no adverse effect was disputed.

Site	Feature	Effect	Project Alone	Project In combination
Dogger Bank cSAC and SCI	Sandbanks which are slightly covered by sea water all the time.	Physical Damage	Y	Y
Farne Island SPA	Common guillemot (breeding & assemblage) Atlantic puffin (breeding & assemblage) Black-legged kittiwake (assemblage)	Disturbance/ Displacement Habitat loss (barrier effect & prey resources) Collision	Y	Y
Flamborough Head and Bempton Cliffs SPA	Common guillemot (assemblage) Atlantic puffin (assemblage) Black-legged kittiwake (breeding & assemblage) Razorbill (assemblage) Northern gannet (assemblage)	Disturbance/ Displacement Habitat loss (barrier effect & prey resources) Collision	Y	Y
Flamborough and Filey Coast pSPA	Common guillemot (breeding) Black-legged kittiwake (breeding assemblage) Razorbill (breeding & assemblage) Northern fulmar (assemblage) Northern gannet (breeding & assemblage)	Disturbance/ Displacement Habitat loss (barrier effect & prey resources) Collision	Y	Y
Forth Island SPA	Atlantic puffin (breeding & assemblage) Lesser black-backed gull (breeding & assemblage) Northern gannet (breeding & assemblage) Black-legged kittiwake (assemblage) Common guillemot (assemblage) Razorbill (assemblage) Northern fulmar (assemblage)	Disturbance/ Displacement Habitat loss (barrier effect & prey resources) Collision	Y	Y

4.8 The potential for LSEs in combination with other plans and projects could not be ruled out for features at the same 5 sites (see *Table 1*). LSEs or no Adverse Effect on Integrity on all the other qualifying features at the other sites were excluded with the agreement of the statutory nature conservation bodies.

4.9 Originally, NE raised a possible impact and difference of view with the Applicant on Humber Estuary SAC and Flamborough Head SAC. There had been concern that the export cable from the Project could impinge on the boundary of the Flamborough Head SAC and affect the reef and submerged and partially submerged sea cave features of the SAC. However, this was resolved following confirmation of the distance between the cable and site and hydrodynamic modelling of sediment deposition. NE were also initially concerned (written representation 17th March 2014) about the impact on Humber Estuary SAC due to the use of remedial cable protection along the nearshore export cable corridor interrupting the long-shore sediment transport supply to the Humber Estuary, Lincolnshire and Norfolk coastlines. The Applicant subsequently confirmed that dynamic sediment processes which could impact on habitats within this SAC would not be affected by the laying and operation phase of the Project's export cable.

NE subsequently, during examination, confirmed to the ExA that in relation to the Humber Estuary SAC and Flamborough Head SAC, it agreed with the Applicant's conclusion of no adverse effect on integrity for all the qualifying features of these sites. **The SoS agrees with the ExA and NE's conclusion of no adverse effect on integrity for those sites, which are not considered further in this report.**

4.10 There are a number of sites identified in Annex A where the statutory nature conservation body agrees with the Applicant's Appropriate Assessment (AA) conclusion that there is no adverse effect on the integrity (No AEOI) of a Designated Site and all the qualifying features of that site, including the nature of the potential effect on the qualifying features of that Site. NE on the 11th April 2014 produced tables identifying areas of agreement and disagreement. These are the only sites that are discussed in detail within this report. This approach was also agreed to by the RSPB in their answers to second written questions, 19th May 2014. **The other sites have been considered by the SoS and he is in agreement with NE and ExA's conclusion of no LSE or Adverse Effect on Integrity for these sites and they are not considered further in the report**.

Habitat loss impact on birds

4.11 Survey data and previous studies used by the Applicant show that the Dogger Bank Zone may, at times, support nationally and internationally important numbers of seabirds (IfAA report). The Dogger Bank Zone is also on the flyway of a large number of migratory birds moving to and from breeding and wintering grounds. As such, wind farm development within the Dogger Bank Zone may have implications for a large number of designated SPAs and Ramsar sites around the North Sea and potentially further afield.

4.12 The RIES has identified habitat loss as a potential LSE at the four SPA sites lists in *Table 1*. However, as identified by the Applicant's IfAA there would be no direct or indirect loss or alteration of supporting habitat from within any designated SPA or Ramsar site screened into the assessment. Data and evidence used by the Applicant also indicates that benthic habitat loss in the offshore marine environment as a result of the installation of wind turbines and other structures in the wind farm would not affect the overall prey resource available to foraging seabirds. No likely significant impact on designated seabird populations is therefore predicted. **The SoS agrees with NE and the Applicant that habitat loss from the Project will not have a LSE on any SPA.**

4.13 Seabird prey resources (specifically fish) within the development area could be temporarily affected by increased underwater noise levels during construction. However, this effect would be localised to the immediate area of piling works and temporary displacement of the prey resource is predicted rather than loss or decrease in availability. During operation of the wind farm, the turbine structures could act as attractants for some fish species and, coupled with potential restrictions on fishing activity, an overall increase in prey availability within the wind farm could occur. However, the impact of such an increase, were it to occur, on seabird populations is extremely difficult to determine and therefore no potential assessed benefit is

attached to this effect. Overall, the Applicant concluded that direct habitat loss and alteration would have no significant impact on designated seabird populations. **The SoS agrees with NE and the Applicant that displacement of sea bird prey from the Project during construction will be temporary and localised and will not have a LSE on any SPA.**

Displacement impact on seabirds

4.14 For northern fulmar, northern gannet ("gannet"), Arctic skua, great skua, black-legged kittiwake, lesser black-backed gull and great black-backed gull, the assigned displacement or mortality value is taken as 0% by the Applicant. NE, however, confirmed during the examination that gannet should be assessed in terms of combined collision and displacement effects. Displacement of seabirds refers to an impact whereby mortality is caused through an effective loss of foraging resource. If birds are displaced from a wind farm site and the surrounding area through prolonged disturbance, they can suffer from increased mortality as they will need to compete with other birds for scarcer resources. The sensitivity to these effects varies between seabird species and is reflected in a number of sensitivity classifications (e.g. Maclean (2009), Furness and Wade (2012)), these are discussed in the Applicant's IfAA report. It is the predicted magnitude of the displacement induced mortality which will determine whether the project will result in an LSE upon the species. NE agreed with the Applicant that LSE were only found for auk species and gannet. For gannet, NE advised that the combined effects of collision and displacement mortality should be considered against population models (NE's written response to deadline V). **We agree with NE`s consideration of this matter and only considers displacement LSEs on auk species and gannet.**

Collision Risk impact on seabirds

4.15 The Applicant in their IfAA report does not predict significant collision losses to guillemot, razorbill, fulmar, puffin, Artic or great skua due to colliding with Project turbines. This conclusion was not disputed during the examination and it was agreed that there were no LSEs for those species due to collision for any of the sites where these species are a feature.

4.16 The Applicant found the number of fulmar, guillemot, Arctic skua and great skua colliding with turbines to be less than one bird per year. Razorbill and puffin similarly have a predicted low risk, with 3 and 2 collisions predicted respectively, assuming a 98% avoidance rate. The collision risk modelling, therefore, indicates that for a number of species only very small numbers of birds would be affected. It is considered that the predicted very low number of annual collisions for these species would not have a discernible effect at the site population level. **The SoS agrees with the conclusion of no LSE for these species due to collisions, at any European site.**

Marine Mammals

4.17 The Applicant, in the IfAA records their boat based and aerial surveys as well as background survey work (Small Cetacean Abundance in the North Sea and SCANS-II (2008) amongst others) that revealed a significant numbers of harbour porpoise may be present in the Project

site and the Dogger Bank Zone and that the area is also used by grey seal and small numbers of harbour seal. The Dogger Bank SCI which forms part of the project zone is not however designated for supporting any Annex II marine mammal populations. The Applicant's IfAA in table 5.1 does set out European site surrounding the project where marine mammals are a feature and where there was consideration of a likely significant effect. The sites in the UK were: Humber Estuary SAC (155km from the wind farm and 30km from the cable route), Faray and Holm of Faray SAC (495km from the wind farm and 540km from the cable route), Isle of May SAC (270km from the wind farm and 265km from the cable route) and Berwickshire and North Northumberland SAC (200km from the wind farm and 175km from the cable route). The other sites were located within Belgium, Denmark, Germany, the Netherlands and Sweden and are further considered within the transboundary assessment in section 12.0.

4.18 The Applicant's screening work identified that the main potential impacts to marine mammals resulting from the Project would relate to:

- potential disturbance and displacement as a result of increased noise levels generated during construction work;
- reduction in prey availability, again due to disturbance and displacement of fish during construction, and
- increased collision risk with vessels during construction and operation.

Of these effects, an increase in underwater noise levels during construction, specifically linked to piling works for the turbines, is considered to pose the greatest potential for impact at the population level. The Applicant therefore undertook modelling of underwater noise levels to inform the assessment of potential behavioural responses of marine mammals during the Project's construction phase. Collision risk, with vessels servicing the Project, and in particular corkscrew injury was identified by the Applicant and discussed during the examination. NE advised (NE's written response to deadline V) that the Marine Mammal Mitigation Protocol secured through conditions 9(e) of DMLs 1 and 2 and 8(e) of DMLs 3 and 4 means they could require propeller guards if advised by guidance currently being developed. At the moment there is not full understanding of why corkscrew injuries occur and the extent to which they are related to wind farm construction and service vessels. Even given this level of understanding the overall risk of such collision was still considered to be low.

4.19 The very low numbers of **harbour seals** observed within the Project site (Applicant's ES) means the SoS can conclude there are no LSEs for any European site inside or outside the UK for which harbour seal is a designated feature.

4.20 **Grey seals** have been observed using the Project site and tagging data has shown that they use the Project site for foraging activities. It is estimated that there are approximately 70,000 grey seals in the North Sea, around 90 % of this population breed in Scotland (Baxter *et al*, 2011). The east coast of England is considered to be important for this species with significant breeding populations at Donna Nook, Blakeney Point and East Horsey. Grey seal movements tend to occur on two distinct scales, long distance travel (up to 2100 km) and local repeated

trips to discrete offshore areas (88 % of trips), most seals tend to forage within 145 km from their haul-out sites (Thompson *et al*, 1996). Grey seals prey on a wide range of species such as sandeels, gadoids (such as cod and haddock) and flatfish, these species are typically found where the seabed sediment is primarily gravel and sand (DTI, 2001).

4.21 The Applicant considers that impacts to grey seals should be considered as having a possible LSE on sites outside the UK. In order to reduce any impacts to seals within the Project zone NE has proposed mitigation measures including a marine mammal mitigation protocol. Seals are a highly mobile species and have a wide foraging zone. They also feed upon a wide range of prey sources. The SoS is satisfied that the conditions 9 (c) and 9 (e) of DMLs 1 and 2 and 8 (c) and 8 (e) within DMLs 3 and 4 will require the Applicant to follow JNCC Guidelines (JNCC, 2010) and are sufficient mitigation measures to protect grey seals.

4.22 There are currently no SACs in the UK that support qualifying populations of **Harbour porpoise**. It is highly likely that harbour porpoise observed within the Project site forms part of the overall mobile southern North Sea population. The Applicant's IfAA showed only an extremely small percentage of the harbour porpoise population for the North Sea would be affected by the Project, both during construction and operation. They found no measurable effect on harbour porpoise prey species abundance from the proposed Project. The Applicant has included mitigation measures which follow JNCC (2010) guideline to avoid harm to porpoise from piling. This includes soft start piling, a 500m exclusion zone and a marine mammal observer. The exact approach will be set out in the marine mammal mitigation protocol to be agreed with the Marine Management Organisation (MMO) and the statutory nature conservation body; this is required within the DMLs. NE, in their written response to deadline V, highlights that due to the use of a Rochdale envelope the eventual project design may alter and therefore this allows them to ensure appropriate mitigation in accordance with final details at a later date.

4.23 The main potential impact from construction is a permanent or temporary threshold shift (PTS or TTS; fleeing response and avoidance) arising from underwater noise from piling. Vessel movement was also considered by the Applicant but they found no evidence to suggest that vessel noise significantly affects harbour porpoise, particularly given the large volume of existing traffic in and around the Project area.

4.24 The use of soft start piling would prevent mortality from the high levels of noise levels from piling associated with the turbines. The Applicant used a worst case scenario of 3,000kJ for the main piling and a soft start of 300kJ of hammer energy. From Otani *et al* (2000) the Applicant based swim speeds as 1.5m/s which is based on a mother and calf pair. Instantaneous mortality would only occur to porpoises within a few metres of the piling. The soft start would prevent mortality as harbour porpoises flee this type of noise so would be at least a few kilometres away by the time the piling increases to a maximum of 3,000Kj.

4.25 During construction based on a worst case scenario the Applicant found the total area of likely avoidance of the working area by harbour porpoise is predicted to affect up to 3.2% of the harbour porpoise and potential harbour porpoise population within the North Sea. However as

they are an extremely mobile species with a wide range of prey species, no significant mortality is predicted. The Applicant assessed the predicted total potential area of avoidance by harbour porpoise if all proposed projects were constructed at the same time, this would result in potential displacement of up to 11.6% of the North Sea harbour porpoise population in the worst year (2016) and decreasing populations thereafter (Applicant's ES). However again given the mobility of this species and their wide range of prey species that it takes, and that there is no indication that avoidance results in mortality; porpoise sensitivity to displacement is considered to be low. Consequently, given that all effects would be temporary and that mortality as a result of displacement is of low probability, no measurable effect is predicted for the North Sea harbour porpoise population during the construction phase for the Project in combination with other projects.

Scope of in combination assessment

4.26 Under the Habitats Regulations, the SoS 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. These include a number of planned and existing offshore wind farms within the vicinity of the Project (see *Table 2*) and a number of projects expected to affect coastal habitats because of works to lay cables, pipelines or improve sea defences.

4.27 As different projects are at different stages of development, there are variable levels of information and certainty on the predicted environmental impacts. For this reason the in combination plans and projects have been grouped according to their development status. This grouping was undertaken by the Applicant using a 5-tier approach based on the SNCB's recommended a 6 tier approach.

4.28 The JNCC/NE tiered approach is as follows (NE written representation):

- Tier One: projects consented and built;
- Tier Two: projects consented and under construction;
- Tier Three: projects consented but construction has not yet started;
- Tier Four: projects submitted to the appropriate regulatory body but not yet consented;
- Tier Five: projects that the regulatory body are expecting to be submitted for determination;
- Tier Six: Projects identified in relevant strategic plans.

4.29 Grouping projects into tiers, enables the SoS to place greater weight in his consideration of those which were operational, under construction or consented and less on those in planning where there is less certainty around the environmental information.

Table 2 Plans and projects included within the Applicant's in combination impacts assessment. (Source: RIES with update from the Applicant's comments to the RIES & the SoCG between the Applicant & NE Appendix A).

Project Type	Project Name
Aggregate Extraction	Areas: 400, 439, 441/1-3, 466/1, 483-4, 485/1-2, 490- 4, 495/1-2, 496, 506, 512, 514/1, 514/3
Cables and Pipelines	Breagh Pipeline
Offshore wind farms	Beatrice (tier 3) Beatrice Demonstration Site (tier 1) Blyth (tier 1) Blyth Demonstration Site (tier 3) Dogger Bank Teesside A & B (tier 4) Dogger Bank Teesside C & D (tier 5) Dudgeon (tier 3) East Anglia ONE(tier 4) – (tier 3 subsequent to the assessment) East Anglia THREE and FOUR (tier 5) European Offshore Wind Development Centre (EOWDC – offshore wind farm) (tier 3) Firth of Forth Alpha (tier 4) - (tier 3 subsequent to the assessment) Firth of Forth Bravo (tier 4) Galloper (tier 3) Greater Gabbard (tier 1) Gunfleet Sands (all projects) (tier 1) Hornsea Project One (tier 4) - (tier 3 subsequent to the assessment) Hornsea Project Two (tier 5) Humber Gateway (tier 2) Inch Cape (tier 4) Kentish Flats (tier 1) Kentish Flats Extension (tier 3) Lincs (tier 1) London Array II (tier 1) – (now not proceeding) Lynn & Inner Dowsing (tier 1) Moray Firth (Telford, Stevenson and MacColl – offshore wind farm) (tier 3) Navitus Bay (tier 5) - (tier 4 subsequent to the assessment) Neath na Gaoithe (tier 4) Bürger-windpark Butendiek Race Bank (tier 3) Rampion (tier 4) - (tier 3 subsequent to the assessment) Scroby Sands (tier 1) Sheringham Shoal (tier 1) Teesside (tier 1) Thanet (tier 1) Triton Knoll (tier 3) Westermost Rough (tier 2)
Oil and Gas	Cygnus Gas Field Development (Alpha and Bravo) Ensign Rochelle
Carbon Capture and Storage	National Grid Carbon Capture and Storage
Tidal	Cantick Head Westray South
Wave Energy	Brough Head (Aquamarine Power) Costa Head Inner Sound

4.30 During the Examination, there was some discussion between the Applicant and NE on the merits of including certain offshore wind farms. The tier five projects, in particular, have a high level of uncertainty associated with them, leading to concerns from the Applicant about the

value of including them within the in combination assessment. A number of projects have changed tier following the end of examination, for offshore wind farms this is identified in the table above. The projects to be included in the Applicant's in combination assessments were agreed between the Applicant and NE within their Statement of Common Ground (Appendix A). In NE's final supplementary ornithology expert report the tables showing in combination impacts only include tier 1-4 projects. No tier 5 wind farm projects were included by the Applicant in the in combination figures, NE recognised that there is less confidence in these project's figures as they have not yet been subjected to examination.

4.31 No LSE was found for habitat loss on sea bird species in combination with other developments. There could be localised impacts on fish from increased underwater noise levels during construction works. However, as this effect would be localised to the immediate area of works (e.g. piling) it would be unlikely to be temporally cumulative across projects. Overall temporary displacement of the resource is predicted rather than loss or decrease in availability.

4.32 **The SoS considers that sufficient information has been provided to inform a robust assessment in line with his duties under the Habitats Regulations. The SoS is unable to exclude LSEs from the 5 sites identified in *Table 1* when the impacts of the Project are considered in combination with other plans and projects. This is as a result of physical damage, habitat loss, disturbance and collision to features including sandbanks which are slightly covered by sea water all the time, black-legged kittiwake, Atlantic puffin, lesser black-backed gull, northern gannet, common guillemot, razorbill and northern fulmar. This is also the view of the ExA, NE and the RSPB.**

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 SoS, 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 effects on the integrity of those sites and features 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 site integrity within reasonable scientific doubt, then under the 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 site 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 SoS to consider whether the Project has the potential for having an adverse effect on a site's integrity, either alone or in combination. The potential for the Project to have an adverse effect is considered for each site in turn.

Dogger Bank SCI and cSAC

6.0 The site supports the largest continuous expanse of shallow sandbank in UK waters and extends into both Dutch and German waters. The SCI is 12,331km2 100% of which is considered to comprise Annex 1 sandbank habitat. The SCI in UK waters adjoins the Dutch and German Dogger Bank SACs. It was formed by glacial processes before being submerged through sea level rise. It is home to a variety of species which live both on and within the sandy sediment (JNCC, 2014[1]). It is located in the Southern North Sea, approximately 150km north east of the Humber Estuary.

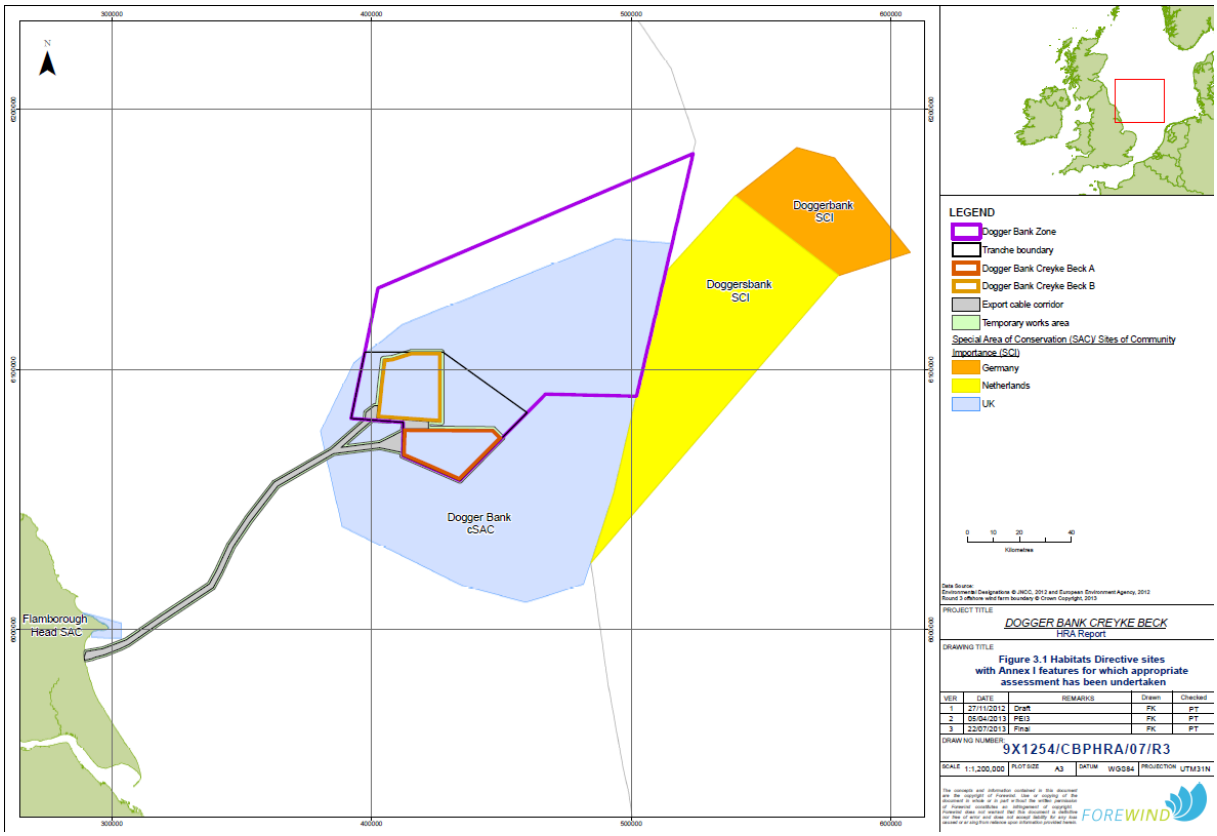


Figure 3 Dogger Bank SCI/ cSAC location extracted from the Applicant's IfAA report.

6.1 The Dogger Bank is an important location for the North Sea harbour porpoise (*Phocoena phocoena)* population which is a non-qualifying feature of the SCI. Grey seals *(Halichoerus grypus*) and common seals (*Phoca vitulina*) are known to visit the Dogger Bank and are also included as non-qualifying features. The sand bank's location in open sea exposes it to substantial wave energy and prevents the colonisation of the sand by vegetation on the shallower parts of the bank. Sediments range from fine sands containing many shell fragments on top of the bank to muddy sands at greater depths. These support invertebrate communities, characterised by segmented polychaete worms (Polychaeta), amphipods (Amphipoda) and small clams (Bivalvia) within the sediment, and hermit crabs *Pagurus bernhardus*, starfish (Asteroidea), flatfish (Actinopterygii), and brittlestars (Ophinuroidea) on the seabed.

6.2 Silver sand eels are an important prey resource found on the sides of the sandbank supporting a variety of species including seabirds, cetacean and fish, including cod *Gadus morhua*.

[1] *http://jncc.defra.gov.uk/page-6508*

Occasional, discrete areas of coarser sediments (including pebbles) were recorded by JNCC[2] on the bank, dominated by the soft coral *Alcyonium digitatum* known as dead man's fingers, the bryozoan sea chervil *Alcyonidium diaphanum* and serpulid worms *Serpula vermicularis*.

6.3 NE has confirmed that the Dogger Bank cSAC is currently undergoing classification by the UK Government as an SAC under the provisions of the EC Directive 92/43 on the Conservation of Natural Habitats and of Wild Fauna and Flora. Dogger Bank is currently both a cSAC and a SCI (following approval as a Site of Community Importance (SCI) by the European Commission (EC)) and this will be the case until the site has been formally designated as a SAC by UK Government.

6.4 The SCI's sole feature 'sandbanks which are slightly covered by seawater all the time' is considered to be in an unfavourable condition. The conservation objectives (see *Table 3* below) reflect this by advising that management measures seek to restore this feature to favourable condition (RIES and NE comments on the RIES)

Table 3 Conservation objectives for Dogger Bank cSAC and SCI (JNCC 2012).

Conservation Objectives	'sandbanks which are slightly covered by seawater all the time' are subject to natural change, restore the sandbanks to favourable condition, such that: ➢ The natural environmental quality is restored; ➢ The natural environmental processes and the extent are maintained; ➢ The physical structure, diversity, community structure and typical species, representative of sandbanks which are slightly covered by seawater all the time, in the Southern North Sea, are restored. The qualifying features to which the conservation objectives refer are: ➢ Sandbanks which are slightly covered by sea water all the time

Physical Damage

6.5 During the construction, operation and decommissioning of the Project there could be impacts on the sandbanks which form part of Dogger Bank SCI. These are set out in stage 2 matrix 1 of the RIES.

Construction & Operation

6.6 Construction of the Project includes activities such as installing foundations for the turbines, laying cables, building ancillary structures and jack-up barge's legs on the seabed. These activities will all cause direct physical disturbance of the seabed, which could impact on the established benthic community. The types of impacts include:

- Contaminated sediments to be re-suspended ingested by sediment-feeding or filter-feeding organisms;
- Localised and temporary increases in suspended sediment concentrations may affect, in particular, filter-feeding benthic organisms;
- Installation of the foundations will cause temporary increases in noise and vibration impacting upon invertebrate life stages. The levels will depend on which pile driving methods are employed.

[2] *http://jncc.defra.gov.uk/page-6508*

- Placement of rock armouring on the seabed to protect turbine bases from scour and to protect cables results in loss of sandbank habitat and may also result in changes to the hydrographic regime and sediment dynamics of the site.

6.7 JNCC has identified that the Dogger Bank SCI sandbank is currently moderately or highly vulnerable to the following pressures (JNCC, 2012):

- Physical loss by obstruction (installation of petroleum and renewable energy industry infrastructure and cables);
- Physical damage by physical disturbance or abrasion (demersal trawling); and
- Biological disturbance by selective extraction of species (demersal trawling).

The Dogger Bank sandbank is of low vulnerability to non-toxic contamination through changes in turbidity; for example, from cable laying (JNCC, 2012a).

6.8 Natural England has advised that the choice of construction technique will affect the level of suspended sediment produced. In the worst case scenario presented by the Applicant in their IfAA report (see table 2.1 for the worst case construction techniques), suspended sediment concentrations are predicted to rise to 200 mg/l against a background level of 2 mg/l. There was concern that a significant change in suspended sediment levels could hinder the achievement of the site's conservation objectives. NE proposed, in their representation, that in order to mitigate this effect the Project chooses lower impact construction techniques (e.g. soft start piling) and limit the area of seabed affected to an absolute minimum.

6.9 Natural England considered that gravity-based structure foundations are likely to create greater levels of suspended sediment than monopile foundations, but operations can also be timetabled to allow potential recovery time for the habitat and the species it supports. The scour and cable protection requirements within the DCO will ensure minimal use of rock for cable and scour protection as well as trenching and burying cables where possible to reduce effects on the sandy substrate. On JNCC's advice, dredged material will not be taken outside the site, to avoid removal of the sand sediment that forms the designated features of the site. However, there may be clay-rich subsurface sediments exposed which would alter the seabed's sediment composition. To mitigate these impacts, use of drill bits that provide finer arising would help the sediment to dissipate. If technically possible, seabed preparation material will be disposed of onsite and other material removed off-site. NE suggested that to gain a clearer understanding of the impact, and therefore any possible mitigation, there should be monitoring of the impact during construction of the Project. This would allow a future decision on what is the best option between collecting the arising to move them off site or leaving them in-situ. This mitigation and monitoring is secured within conditions of 7, 9, 14, 15, 16 and 25 of DMLs 1 and 2 and DMLs 3 & 4 conditions 6, 8, 13, 14, 15 and 24 in the DCO.

6.10 The Applicant found the construction impacts to be temporary, short-term, and negligible in magnitude. The worst case of impacts still means the SCI remains within its current natural environmental range. The magnitude of potential increases in suspended sediment concentrations is considered by the Applicant to be negligible due to the temporary nature of the

increase and in the context of natural, storm-induced, increases in suspended sediment concentrations. The alteration to subtidal sandbank communities from physical disturbance or sediment deposition during construction or re-suspended sediments released during construction would not significantly alter the diversity, community structure or typical species. The Applicant's conclusion given the micro-scale which disturbance would occur, and the very low sensitivity and high recoverability of the communities that could be impacted is that there will not be an adverse impact from the construction of the Project on Dogger Bank SCI. NE agreed that the project alone would not adversely affect the sandbank feature of the SCI provided that the Project was ultimately decommissioned (RIES).

6.11 Changes in contamination were not thought by the Applicant to cause an impact on the communities found at Dogger Bank SCI. The existing sediment only has a very low level of contaminants present, so no increase in contaminant levels would occur above the existing fractions present in suspended sediments or waters within the site.

6.12 The Applicant considers the construction impacts to be temporary as it is only for the duration of the project, and the habitat would be able to recover once the Project is decommissioned. The Project would disturb approximately 0.29% of the benthic community within the subtidal sandbanks feature of the Dogger Bank SCI (only up to 0.17% of the habitat itself will be lost during the Project operation, RIES). The impact is also considered short-term as the species dependent on the habitat have a low sensitivity to physical disturbance and they have a high recoverability to short-term impacts. The Applicant also argues that the high level of disturbance from trawling means that the communities within this site are adapted to a level of disturbance including increased suspended sediment concentrations and sediment deposition. The changes to the levels of sediment concentrations are predicted by the applicant to fall within the ranges currently experienced with the site. The Applicant concludes that there are no long-term changes in the extent, composition and distribution of the benthic communities beyond localised temporary changes.

6.13 NE suggested that this project should be managed using an adaptive management approach to identify, mitigate and monitor impacts on suspended sediment during construction (HRA hearing on the 1st July 2014). There would be no impact from construction if the disposal mounds return to sandy sediment following construction, as the sandbanks are not sensitive to topographical change. However, monitoring should also be undertaken during the Project lifetime in order that any unpredicted impacts could be further reduced. NE explained that, in relation to the disposal mounds, it is uncertain how they will interact over the lifetime of the Project. There is the possibility of clay being present in the drill arisings which, if deposited in the mounds at the seabed surface, could impact upon the sandbank feature. The applicant expects that any clay would disperse over time leaving only sand. However, NE considers that, as the disposal mound behaviour in relation to clay is not fully understood, there is the potential for the sandbank feature to be changed. Therefore, NE stated that it had been agreed with the Applicant that monitoring will happen over the lifetime of the Project (monitoring the form and function, composition and communities of the sandbanks) and, at the time of decommissioning, further consideration will be given to any removal/remedial/restoration work required based on the outcomes of monitoring.

This has been secured within the DCO through Requirements 3, 4, 5 and 6 which restrict the turbine and cable design, size and protection and the DMLs 1 & 2 (conditions 3, 4, 5, 7, 9, 14, 15, 16 & 25) and DMLs 3 & 4 (conditions 3, 4, 6, 8, 13, 14, 15 & 24) will provide details on the operational design, layout, method statement, pollution prevention, environment management, construction, mitigation, monitoring, any amendments necessary during the Project and an 'In Principle Monitoring Plan' of the offshore works. It is recognised by NE that the final parameters of the Application will determine the true impact to the sandbanks and therefore adaptive management will incorporate monitoring to ensure that at the time of decommissioning the site will be returned to its original state. NE stated on the 1st July at the examination that, adaptive management measures allow for a pragmatic, but suitably precautionary approach. It considers that this risk-based approach to monitor and respond with appropriate mitigation, may be appropriate when there is no guidance and no clear thresholds. This is considered common practice in conservation when evidence is not available by NE.

6.14 Increased suspended sediment concentrations for the operational phase (due to re-suspension of sediment as a result of scour around installed structures) would be significantly lower and occur less frequently than for the construction phase. Increased suspended sediment concentrations would occur during storm events and, as such, are considered to both temporally and quantitatively mimic the elevated suspended sediment concentrations already occurring during these intermittent periods.

6.15 The Applicant's assessment indicates that, the effects associated with the operation of the Project that could affect the subtidal sandbanks feature would be temporary, short-term, very low in magnitude, and remain within the ranges currently experienced by the species and communities, and to which they have adapted to. There may be intermittent disturbance under the worst case scenario investigated by the Applicant, however the species and communities affected have a low sensitivity to the disturbance impact and would rapidly recover**.**

6.16 In order to ensure monitoring could lead to changes in construction and adaptive management is possible during the Project. The SoS notes that the MMO is given the function under conditions in the DMLs of approving plans and programmes relating to construction, etc., including approving amendments to approved plans under condition 25 of DMLs 1 and 2 and condition 24 of DMLs 3 and 4. Further, the MMO is also able to exercise functions under Part 4 of the Marine and Coastal Access Act 2009 and the SoS has functions under article 11 of the DCO in relation to the restoration of the site.

6.17 **The SoS considers that the sand bank habitat is able to recover from the physical disturbance predicted to occur during the construction and operation of the project. Even under the worst case scenario, impacts are limited and will not prevent the conservation objectives for the Dogger Bank SCI being achieved. This is also the view of the ExA and NE. Mitigation and monitoring has been included within the Development Consent Order and will ensure that impacts are minimised.**

Decommissioning

6.18 As stated in section 2.10 the effects of the decommissioning phase are the same, albeit smaller in magnitude and intensity, to those described and assessed for the construction phase, as described above given that all effects would be temporary, there would not be an adverse effect on the integrity of the Dogger Bank SCI. In order to allow the sandbanks habitat to recover decommissioning would require the removal of all infrastructure including persistent clay casts from drill arisings that lies on, or protrudes above, the seabed including all protection measures such as rock and mattresses. NE's view is that the DCO, DMLs including the In Principle Monitoring Plan would ensure and removal/ remedial/ restoration work required based on the monitoring outcomes from the Project (Panel's report, NE response to the RIES). This would be implemented through the decommissioning programme required by Requirement 10 of the DCO (and the SoS has functions under article 11 of the DCO in relation to the restoration of the site). The Energy Act 2004 gives the SoS the power to require a decommissioning programme. Decommissioning activities will need to comply with all relevant UK legislation at the time. The person(s) responsible for the wind farm will produce and agree a decommissioning programme with the Department of Energy and Climate Change (DECC) and in consultation with the MMO, SNCBs or their respective successors. The SoS is able to reject a decommissioning programme and, if he does so, may himself prepare a decommissioning programme. In taking decisions, on decommissioning plans, the SoS will be bound by the requirements of the Habitats Directive and other relevant legislation. Any works to decommission offshore infrastructure would also require a Marine Licence. The MMO would also be bound by the requirements of the Habitats Directive when issuing a Marine Licence. The decommissioning programme and Marine Licence would be able to require the removal of all infrastructure on or above the seabed following decommissioning of the Project. NE advised that provided the Project is decommissioned successfully, NE considers that there would be no adverse effect on Dogger Bank SCI arising from the Application alone.

In combination

6.19 The RIES includes all the plans and projects that were assessed in combination with this Project. These were discussed and agreed with NE and include those listed in *Table 2* above.

6.20 The RIES states that NE advised they cannot conclude that there will be no adverse impact on this site arising from the Project in combination with the oil and gas industry development, aggregate extraction areas, the Teesside A and B offshore renewables projects and fishing activities within the Project site, based on the overwhelming contribution of fishing activities to the unfavourable condition of Dogger Bank SCI. NE also noted (Interested Parties Deadline IV submission) that that the combined impacts of other non-fishing activities are thought to be significantly smaller in magnitude than the inter-annual variation in pressure from fishing activities.

6.21 There are no established 'universal' thresholds for the degree of effect for example the percentage loss of habitat) that would constitute an adverse effect on site integrity. However

during the examination (deadline IV) NE were concerned that the magnitude of impact of the Project and with other non-fishing activities lies within the 'contentious' range of impact scales in relation to previous decisions, i.e. in some cases this scale of impact has been treated as adverse effect on site integrity, in others as no adverse effect on site integrity.

6.22 NE cited work by Hoskin & Tyldesley (2006) who reviewed legal judgements and Inspectors' decisions relating to habitat loss and site integrity for an English Nature research report. The review examined development projects with small scale effects of approximately 1.0% or less of land take or habitat loss. The review concluded that habitat loss of a very small scale, including losses in the order of 0.1% or less of a site, in specific cases has been regarded as an adverse effect on site integrity of a designated site. This has been the case, for example, where the habitat loss is non-reversible or affects the function of the habitat. The DTA's Habitats Regulations Assessment Handbook (2013) reiterates this and points out that in other cases such a loss may not be an adverse effect on site integrity. Both references emphasise that percentage loss is not the only consideration and that ecological function of the area affected should also be assessed in the 'integrity test'.

6.23 NE advised that the habitat loss in combination would be 'long-term temporary impact', they used this term to describe the impact which would only affect the site during the operation of the Project and following decommissioning the habitat will be able to recover. They are satisfied that the decommissioning programme and appropriate licence conditions in the future will ensure the removal of all infrastructure that lies on or protrudes above the seabed, including all scour/ cable protection measures such as rock and mattresses.

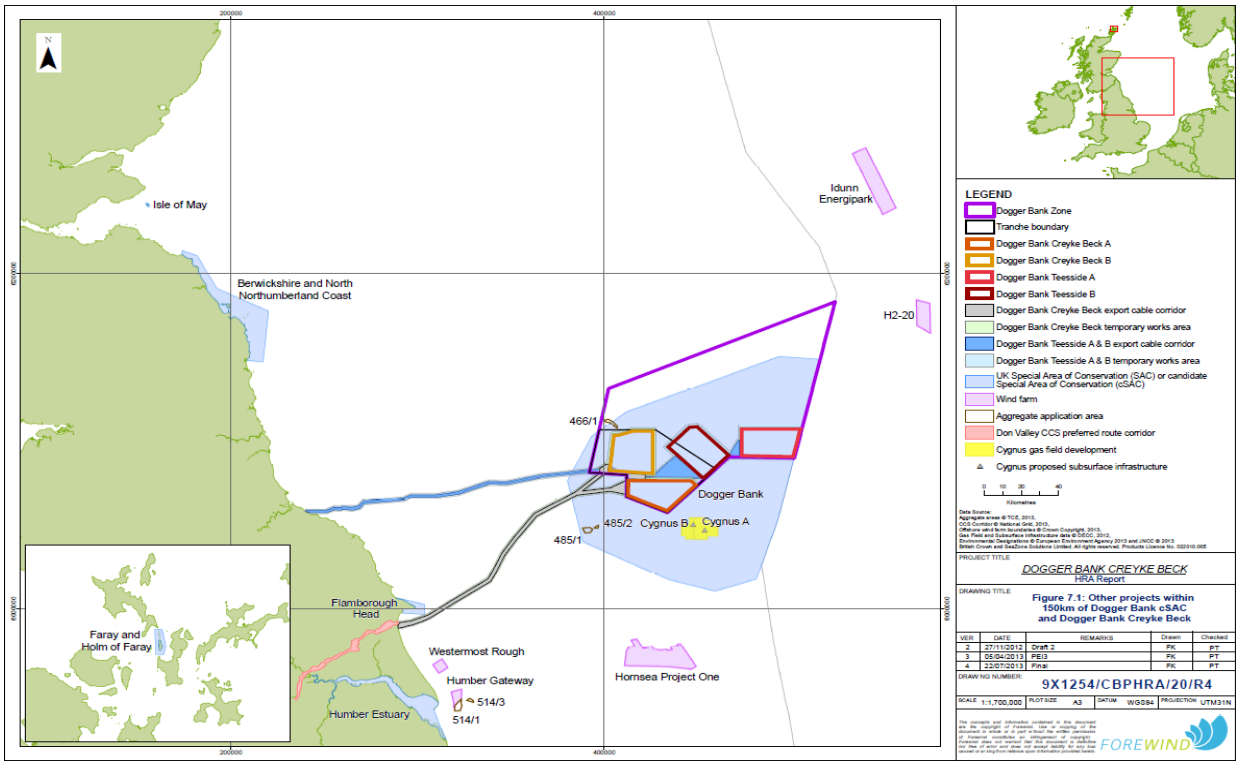


Figure 4 Other projects within 150km of Dogger Bank cSAC and Dogger Bank Creyke Beck from the Applicant's IfAA report.

Fishing

6.24 The Secretary of State considers that this assessment should take account of ongoing fishing activity, as it can affect the historical baseline ecology of the site. NE (7th July 2014 written response to deadline VI) considers that this activity is causing the site to be in unfavourable status. Consistent with Article 6 (2) of the Habitats Directive there are proposed management measures aimed to reduce the impact from damaging fisheries activities from vessels from the UK and other EU Member States with a direct management interest in the area. The proposals are to close approximately one third of the UK SCI to damaging fishing gear. These measures are being pursued by Defra on behalf of the UK government, together with the Governments of the Netherlands, Germany and Denmark. In line with the common fisheries policy measures will require the agreement of all Member States with a direct fisheries management interest. Measures are unlikely to be in place before 2016. Fishing is an ongoing activity and not something new that may affect it in future. This impact has therefore been considered as part of the background impact on the site.

6.25 When fishing is added into the in combination assessment NE could not conclude that there will be no adverse effect on site integrity. NE based this conclusion upon the overwhelming contribution of fishing activities to the unfavourable condition of the site. They also considered that the combined impacts of other non-fishing activities are significantly smaller in magnitude than the inter-annual variation in pressure from fishing activities (NE Interested Parties Deadline IV submission). NE, however during the examination advised that the effects of the Project needed to be considered in the context of the proposed fisheries management measures, which when fully implemented will make a significant contribution to the restoration of the site to favourable condition. The Panel's report also considers this advice but found that it would not be unreasonable to conclude that the smaller scale impacts of the proposed development would be managed through the risk based adaptive management approach, secured through condition 9, 14, 15, 16 & 25 in DMLs 1 and 2 and 8, 13, 14, 15 & 24 of DMLs 3 and 4 of the recommended DCO, if made, and decommissioning secured by Requirement 10. In these circumstances, given the adaptive management measures and decommissioning, it could be concluded that there would be no adverse effect on site integrity.

Hydrodynamic affects

6.26 The Applicant, in their IfAA, has concluded in respect of the in combination assessment that changes in hydrodynamics would be very localised (i.e. limited to the immediate vicinity of individual project areas, which in this case are turbine locations) although widespread across Dogger Bank; however, these changes would not be significant in the context of natural variation in physical parameters and would not give rise to any discernible change in the extent and morphology of sandbank features or the benthic communities that these features support. For all the projects assessed in combination with this wind farm Project there would also be rapid recovery of benthic communities within areas of the SCI affected by seabed disturbance both during construction and operation of the wind farm. The total area of habitat that would be lost for all projects combined for the duration of the Project's operational phase is not considered to be

significant at the scale of the SCI (loss is 0.17% of habitat in combination); and where perceived negative effects arise (such as the considerably small temporary reduction in the extent of the sandbanks feature) potentially beneficial environmental effects which could offset this as a consequence of reduced fishing activity in areas adjacent to installed structures (RIES).

6.27 There would be high levels of localised, temporary and intermittent increases in suspended sediment concentrations resulting from the Project in combination with other projects, particularly and to a greater extent if the adjacent Dogger Bank Teesside A & B project (subject to a separate application for development consent under the Planning Act 2008) has an overlapping construction timetable. Spatially, the areas of the SCI affected change over time and, consequently, the subtidal features likely to be affected would change over the duration of the concurrent and overlapping constructions (and the aggregate dredging activities). However, all of the sandbanks communities have a low sensitivity to increased suspended sediments, and are communities used to high levels of suspended sediments for temporary durations (e.g. during storm events). Consequently, given that the highest sediment concentration levels would be short-term in nature and the majority of suspended sediment concentrations are expected to remain within natural variability when considered in light of storm derived increases in suspended sediment concentrations, restoration to natural environmental quality (suspended sediments) would not be compromised.

6.28 During decommissioning, the greatest source of re-suspended sediment is likely to derive from the process of removing buried cables, and is predicted to be significantly lower in quantity and duration than that for construction given that the majority of sediment disturbed would be sand and gravel. Consequently, given the short-term and temporary nature of the in combination effects of decommissioning of the Project and Dogger Bank Teesside A & B (the aggregate and oil and gas projects do not have a project life that extends to this phase) the predicted concentration levels are expected to fall within natural variability.

6.29 Following decommissioning, no additional suspended sediment concentrations would derive from project (or human) activities related to the Project or Dogger Bank Teesside A & B (if consented), and given the project timescales for other projects, other than existing activities (such as fishing) the natural environmental quality would be undisturbed.

Disturbance

6.30 The Applicant has found that there would be disturbance to seabed sediments during the construction of the Project. This needs to be looked at in combination with the proposed construction of Dogger Bank Teesside A & B and the Cygnus Gas Field structures, and potentially aggregate dredging to the north-west and south which would result in re-suspended sediments being deposited within Dogger Bank SCI. However, given the short residence time for deposited sediments, in the worst cases and for all projects combined, the small thickness (no greater than several millimetres) of deposited sediment, the low sensitivity of the sandbank communities to the predicted levels of sediment deposition and the current natural cycles of sediment deposition and movement around the SCI, the temporary changes are expected to remain within levels of natural variability.

6.31 Given the low sensitivity of the sandbank communities to the temporary and intermittent effects predicted to occur during the construction phase, no significant alteration to the physical structure, diversity, community structure, and typical species is expected during the construction phase for the Project in combination with other projects.

6.32 Significantly less sediment would be re-suspended during the operation phase for the Project in combination with the other projects compared to the construction phase. Given that the majority of deposition would be linked to storm events, and given the natural cycle of sediment deposition and movement during tides, the natural processes are expected by the Applicant to remain within the current levels of variability.

6.33 The RIES reports that the extent of the sandbanks feature would reduce slightly for some of the seabed types with an associated increase in the extent of hard substrate for the duration of the operation phase for the Project in combination with other projects. The other project resulting in similar levels of reduction in extent for this phase is Dogger Bank Teesside A & B. Following completion of decommissioning however, the extent of sandbank feature would return to the current baseline.

6.34 As the increased suspended sediment concentrations, sediment deposition, and hydrodynamic changes during operation, as a result of the Project in combination with the other projects, are considered to remain within the natural variability of these processes, no influence is expected in relation to the physical structure, diversity, community structure, and typical species of the sandbanks communities. Furthermore, the Applicant, RIES and ExA finds that the localised, and in total, negligible, reduction in the extent of the feature resulting from the footprint of structures during the operation phase would not result in a change in the physical structure, diversity, community structure, and typical species of the sandbanks communities throughout the SCI. Consequently, the long-term but temporary changes would not alter the ability for the sandbanks communities to achieve their conservation objectives.

6.35 Significantly lower levels of sediment re-suspension and deposition would occur during decommissioning, and on completion there would be no additional re-suspended sediments and deposited sediments outside of those naturally recycling within the SCI. On completion of the decommissioning stage, no disturbance to hydrodynamic processes would arise due to the removal of structures from the SCI. On completion of the decommissioning stage, the sandbanks communities would have no disturbances or interactions which would prevent them being restored.

Conclusion

6.36 NE confirmed that they could conclude no adverse effects on integrity of the Dogger Bank SCI/ cSAC for the Project alone. The ExA concluded that there would be no adverse impact on the Project alone and in combination with other projects and plans due to the small scale of impact, which would be managed through the condition 9, 14, 15, 16 & 25 in DMLs 1 and 2 and 8, 13, 14, 15 & 24 of DMLs 3 and 4 and the Requirement 10 of the DCO. The SoS considers that fishing is an ongoing activity and not something new that may affect it in future. This impact has therefore

been considered as part of the background impact on the site. **The SoS is therefore satisfied that the Project (alone and when considered in combination with all relevant plans and projects) will not have an adverse effect upon the integrity of the Dogger Bank SCI.**

Flamborough and Filey Coast pSPA

7.0 The Flamborough and Filey Coast potential SPA (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. The pSPA covers a total area of 8039.6 ha.

7.1 Between 20 January 2014 and 14 April 2014 (during the start of the Examination), NE held a formal public consultation on the designation of the Flamborough and Filey Coast pSPA. This pSPA, if confirmed by the Secretary of State for the Environment, Food and Rural Affairs, would represent a geographical extension to the existing Flamborough Head to Bempton Cliffs SPA and add several species to the formal citation.

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

7.3 The pSPA consists of the following proposed changes to the existing Flamborough Head to Bempton Cliffs 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
- Addition of the following migratory features to the pSPA citation; northern gannet, common guillemot, razorbill and incorporates an update to the published population figures for migratory black-legged kittiwakes.

7.4 It should be noted that there are currently no conservation objectives available for the Flamborough and Filey Coast pSPA. In order to undertake this assessment in line with the Habitats Regulations, the SoS has assumed that the new conservation objectives will be broadly similar to that at the current Flamborough Head to Bempton Cliffs SPA (as shown in *Table 4*) but applicable to the additional species (listed in point 7.3 and *Table 1*). This approach has been undertaken by the SoS in previous HRAs (e.g. Hornsea and East Anglia ONE), it was discussed during examination and the Applicant and NE anticipated that the SoS would follow a similar approach.

Table 4 Conservation objectives for the Flamborough Head and Bempton Cliffs SPA, these form the basis for assessing the impacts of the Project upon the Flamborough and Filey Coast pSPA.

Conservation Objectives	Avoid the deterioration of the habitats of the qualifying features, and the significant disturbance of the qualifying features, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the Birds Directive. Subject to natural change, to maintain or restore: ➢ The extent and distribution of 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 distribution of the qualifying features within the site The qualifying features to which the conservation objectives refer are: ➢ Black-legged kittiwake (*Rissa tridactyla*) (breeding) ➢ Northern gannet (*Morus bassanus*) ➢ Seabird assemblage

7.5 An LSE upon the interest features of the site was identified in the RIES because of the potential for the Project, both alone and in combination with other plans and projects, to cause habitat loss, increase collision mortality and displacement mortality rates. The potential for these impacts to constitute an adverse effect on integrity are considered for each species in turn.

Gannets

7.6 The Flamborough and Filey Coast pSPA support an important breeding population of gannets. The population has grown rapidly since the 1980's when only a few hundred breeding pairs were present; estimates of numbers in 2012 were 11,061 pairs or 22,122 breeding individuals (JNCC Seabird Colony Register Counts).

7.7 It is estimated that the UK population of gannets is 440,000 individuals (Baker et al, 2006), with a global population of 610,000 (Tucker et al, 2004). In the UK, the gannet population is concentrated in northern Scotland, and whilst they are widely distributed in English seas during winter, the only breeding colony in England is at Bempton Cliffs. The Applicant has used a mean foraging range of 93km, a mean maximum of 230 km and a maximum of 590km for Gannet (Thaxter et al. (2012)).

7.8 A likely significant effect upon gannets was identified due to the potential for the Project to cause habitat loss, increase collision mortality and displacement mortality rates both alone and in combination with other plans and projects.

Operational Collision Risk

7.9 There are two parts to estimating collision mortality. The first is to understand the number of birds passing through the swept area of the turbines within the offshore wind farm. This is determined by calculating the number of birds which are likely to be passing through wind farm and then factoring in the heights above sea level at which various species fly at to determine the numbers of birds at collision risk height. This calculation is done using a mathematical model, the Band model being the most commonly used.

7.10 There are several different versions of the Band model which use bird flight height in different ways to produce different estimates of collision risk. Band models options 1 and 2 (known as the

basic Band model) assume that all individuals of a species of bird fly at the same height. For Band model option 1, that height is determined by aerial or *in situ* boat surveys. For Band model option 2, that height is based on published literature from Cook *et al* (2012). Band models options 3 and 4 (known as the extended Band model) use detailed flight height data to calculate the proportional risk to a bird according to its location within the swept rotor space. The rationale being that if a bird is closer to the nacelle then it is at greater risk of collision than if at the edge of the blade. Band model option 3 uses flight height data published in Cook *et al*, 2012. Band model option 4 builds on the assumptions of Band model option 3, but uses site specific flight information gathered during survey work to generate a flight height distribution. Band collision risk model (Band *et al.* 2012):

- Option 1 - using the basic model, i.e. assuming that a uniform distribution of flight heights between lowest and highest levels of the rotors; and using the proportion of birds at risk height as derived from site survey;
- Option 2 - again using the basic model, but using the proportion of birds at risk height as derived from the generic flight height information;
- Option 3 - using the extended model, using the generic flight height information.

7.11 The second step in estimating collision mortality is to define the percentage of birds that are likely to make a behavioural response to the presence of a wind farm (or to an individual turbine) so as to avoid flying on a path that puts them at risk of collision with the rotating turbine blades. This is known as the avoidance rate (AR). The choice of AR has a significant influence on the number of predicted collisions (see Table 5 for an example of how choice of AR can make a significant difference to predicted impacts). The overall AR will be the result of a combination of factors including macro-avoidance (of the whole wind farm, by diverting over or around it) and micro-avoidance (ability to avoid collision with a turbine blade once within a wind farm). In practice, the actual AR for any given location will also be affected by site-specific and temporal variations, including the layout of turbines, weather and visibility, whether the birds are foraging or migrating and also whether they are part of a large flock.

7.12 Whilst collision AR can be generic, where essentially the same rate of turbine blade avoidance is assumed for a wide range of bird species, irrespective of any behavioural assumptions or empirical observations, it can also be tailored to a species or group of species on the basis of qualitative assessments (taking known behaviours including manoeuvrability into account) and empirical data (such as surveys of actual bird behaviours for example blade avoidance, or mortality impacts evidenced by recovered dead bird counts). Species-specific AR have been developed by Scottish Natural Heritage to take into account factors such as the behaviour patterns, reactions, size and agility of different bird species (Scottish Natural Heritage, 2010).

7.13 On the 25 November 2014, the Statutory Nature Conservation Bodies (SNCBs) published their responses to the Marine Scotland Science report (Cook *et al*, 2014). The Marine Science Scotland report was commissioned to provide a review of the evidence used to determine avoidance rates for use in Collision Risk Modelling (CRM) for five priority species (kittiwakes, gannets, herring gulls, lesser black backed gulls and greater black backed gulls) and make

appropriate recommendations as to which AR and which version of the Band Model should be used to undertake CRM.

7.14 The SNCBs in general supported the conclusions of the report, agreeing a range of ARs for the basic Band model (options 1 and 2) and for specific species (gulls) the use of the extended Band model (options 3 and 4) (Joint response from the SNCBs to the Marine Scotland Science avoidance rate review, 2014).

7.15 Although Cook *et al* (2014) was not published in time to be considered during the Examination, the SoS recognises that this is an important addition to the evidence base and therefore wishes to ensure that the conclusions reached within the AA are consistent with the latest position of the SNCBs.

7.16 Once the number of birds expected to collide with the wind turbines has been calculated, the next step is to determine what impact that will have on the species population on a recurring annual basis. There are several methods of doing this; the Applicant has primarily used Potential Biological Removal (PBR) analysis following work done for Triton Knoll Offshore Wind Farm to calculate this but has used Population Viability Analysis (PVA) for some European sites where sufficient data was available.

7.17 PBR analysis quantifies the potential level of additional mortality which could occur on an annual basis without resulting in a long term population decline. One of the key parts of the PBR calculation is determining what the recovery factor (f value) for a species is. This value (ranging between 0.1 and 1.0) is intended to compensate for the inherent uncertainties present when making estimates about impacts upon a population. A recovery factor of 0.1 is often used for endangered species/populations where the risks of getting a prediction wrong would have serious consequences for that species/population. Dillingham and Fletcher (2008) proposed using PBR for birds and made the connection between International Union for the Conservation of Nature and Natural Resources criteria (in commas below):

- *F* = 1.0 for populations of '*least concern'* species that are known to be increasing or stable;
- *F* = 0.5 for populations of '*least concern'* species that are declining or of uncertain trend;
- *F* = 0.3 for populations of '*near threatened'* species; and,
- *F* = 0.1 for populations of '*vulnerable*' and '*endangered*' species.

7.18 The Panel's report sets out the detail of the PBR model equation PBR=Nmin x Rmax / 2 x F that was used and the various factors within this equation:

- PBR = the number of additional animals which can be removed safely;
- Nmin = the minimum population estimate;
- Rmax = maximum net recruitment rate; and
- *F* = a recovery factor.

7.19 During the Examination, there was discussion between the Applicant, NE and the JNCC about which version of the Band model was appropriate for use with the Project and which ARs should be used to undertake the CRM. NE and JNCC (relevant representation 8th November 2013) did

not support the use of the Extended Band (2012) model (options 3) for use in collision risk modelling as they considered that its use had not been validated. There was also disagreement regarding the in combination assessment, due to the exclusion of appropriate offshore wind farm sites.

7.20 The Applicant (IfAA report) estimated that six adult birds (and four non-breeding birds) could be lost annually, during the breeding season, as a result of collision. They identify apportioning of the annual collision estimate during the breeding season attributes a collision loss of 6 (5.3) adults representing 0.03% of the SPA population. For non-breeding birds (summer and winter), 4 (3.2) birds lost through collision are attributed this SPA, representing 0.01% of the designated SPA population. In total they found the loss of adult birds through collision at this SPA would represent an increase in the background mortality of 0.65%. A Potential Biological Removal (PBR) value of between 286 to 393 birds has been established for this species at Flamborough Head (IfAA report).

7.21 Natural England in their June 2014 supplementary expert report advised that there would be no adverse effect on the integrity of the site for the project alone under all scenarios. NE has assumed a 98% avoidance rate which falls within the 0.4 PBR threshold (*F* value). They do recognise the emerging evidence for the use of an avoidance rate of 99% for gannets (Krijgsveld *et al*.2011). The SoS has considered the representations made by both the Applicant, NE, JNCC and the RSPB and the recommendation as made by the ExA. The SoS recognises that an avoidance rate of 99 % has been adopted for gannets in the considerations for Triton Knoll, East Anglia One AA, Rampion and Hornsea Offshore wind farms.

7.22 From the SoCG Appendix 14 between the Applicant and NE they agreed PBR for gannets within the precautionary ranges. They agree the annual mortality threshold estimated for the total population of gannet was 659 for a *F* value of 0.5. The breeding adult components of these estimates were 503. Extracted from the Applicant and NE's appendix 14 on PBR rates for Flamborough and Filey Coast:

All ages:	Breeding Adults:
F = 1.0 =1,318	*F* = 1.0 =1,006
***F* = 0.5 = 659**	***F* = 0.5 = 503**
***F* = 0.4 = 527**	***F* = 0.4 = 402**
F = 0.3 = 395	*F* = 0.3 = 302

7.23 The Applicant ES shows that using site-specific flight height data in Option 1 of the Band collision risk model (Band et al. 2012), analysis would suggest an average of 199 northern gannet collisions per year see Table 5. Using Option 1, mean annual estimates represent less than 0.1% of the total population of the overall suite of protected sites around the North Sea at which the species is a feature. For this European site it means, less than 1% of the population at this site would be impacted even if Option 1 of the Band collision risk model were followed. This would reflect an increase of 1.3% of background mortality.

7.24 This AA has used a 99% AR for gannets; however following the publication of the Cook *et al* (2014) report, the SNCBs have formally endorsed the use of a 98.9%. The SoS accepts that the use of a 99% AR in this AA is less precautionary than has been endorsed by the SNCBs. However given that this equates to the mortality of an additional 1 gannet at risk, the SoS is satisfied that this additional mortality (from using a 99% AR rather that a 98.9 % AR) will not materially affect the results of his assessment and will not lead to an adverse effect on the integrity on any of the European sites potentially affected by the Project either alone or in combination with other plans and projects.

7.25 Given the available evidence which documents greater avoidance of OWFs by gannets than for many other species and estimates an overall avoidance rate of 99.1% for this species (Krijgsveld *et al* 2011), the SoS is of the opinion that the use of an avoidance rate of 99% for gannets is appropriate for this species.

Table 5 Conclusions on annual gannet annual collisions. Extracted and calculated from NE's final supplementary ornithological expert report, SoCG with the Applicant, Applicant's response to the ExA first written question 40 Appendix 1 and the Applicant's ES.

Band option	Band option 1/ 2				Applicant (band options 3)		
Avoidance rate	98%	98.9%	99%	99.5%	98%	99%	99.5%
Total annual collision risk estimates at the Project site	397	218.8	199	100	121	60	30
Flamborough & Filey Coast	10 (sourced SoCG)	5.5 (calculated)	5 (calculated)	2.5 (calculated)	8	4	2

In combination

7.26 From the in combination assessment NE in their updated supplementary expert report noted:

- Tracking data for gannets breeding at the pSPA (Langston & Teuten 2012; Wakefield *et al*. 2013) suggest that few if any foraging trips include offshore wind farms in The Greater Wash. Collision predictions in the breeding season for Triton Knoll, Race Bank, Sheringham Shoal, Dudgeon, Lincs and LID are however attributed to the pSPA in the in combination test, and thus the total effect may be considered an overestimate;
- Several projects contributing to the in combination test may overestimate collisions based on changes to worst case Rochdale envelope project designs (East Anglia One, Triton Knoll, Dudgeon wind farms). This is included in the Applicant's in combination collision scenario, but not the basic Band model scenarios;
- No Tier 5 projects were included by the Applicant in the in combination test (Navitus Bay, Hornsea Project Two, East Anglia 3, East Anglia 4) but it should be recognising there may be less confidence in these figures as not subject to examination as yet.

Table 6 Conclusion on in combination gannet annual collisions. Extracted from Annex 1 of NE's final supplementary ornithological expert report.

Band option	Band option 1/ 2				Applicant (band options 1, 2 and 3 where available)
Avoidance rate	98%	98.9%	99%	99.5%	99.5% (for band options 1 & 2); 99% (for band options 3)
Flamborough & Filey Coast	342.7[3]	188.5 (calculated)	171.4[3]	85.7	84.2

Applicant's calculated PBR = 286-393 (RIES), NE uses a PBR = 362 in their written summary of oral case put by Natural England at the second Habitats Regulations Assessment issue specific hearing.

7.27 The SoS agrees that there are significant levels of uncertainty associated with both the scale of future projects and their associated impacts. Future projects also could not be lawfully consented should they be unable to demonstrate that they will not result in an adverse effect upon the integrity of a European site. The SoS is therefore satisfied that the in combination impacts of future projects will be fully assessed at a later stage when they are being considered for consent.

7.28 NE in their updated supplementary expert report for gannet at the pSPA they use a *F* value of 0.4. This finds no adverse effect even at an avoidance rate of 98%. However NE also notes in Hornsea Project One a value of 200 was suggested to be a suitable lower limit at which no adverse impact could be determined. Whilst they did also discuss that higher values than 200 may also be appropriate to conclude no adverse impact. The PBR for these figures was based on a *F* value of 0.4.

7.29 **The SoS, noting the predicted the PBR analysis, using a 99% avoidance rate and the agreement between NE and the Applicant, concludes that the collision risk from the Project alone and in combination with other projects will not have an adverse effect upon the integrity of the Flamborough and Filey Coast site. He considers that a 99% AR is sufficiently precautionary for gannets and this is in line with his previous decisions and scientific publications.**

Habitat loss / alteration

7.30 The RIES identifies a LSE as a result of offshore habitat loss affecting prey availability. The Applicant within their IfAA discusses the implications of changes in habitats that may be utilised by birds during construction of the Project. The Applicant's view that the location and nature of the proposed project would preclude any direct loss of habitat from within the defined boundaries of these sites. This means that any impacts on designated bird populations would, therefore, be indirect and relate to: the loss of habitat from within foraging areas (i.e. from within wind farm location, the cable route and landfall); changes in prey availability as a result of loss of offshore habitat; and fluctuation in prey availability due to changes in water quality and the effects of increased underwater noise levels.

7.31 The Applicant identified that a reduction in prey resources from within seabirds' foraging grounds may decrease their ability to derive sufficient energy to maintain reproductive condition and / or

[3] *9 additional birds were found to be at risk from mortality due to displacement see 7.36-7.40 in this report. This would made 351.7 at 98% and 180.4 at a 99% avoidance rate.*

raise young. In this case however the construction activities are temporary albeit occurring over a long period; however the effects that could impact upon habitat utilisation by seabirds would be localised and temporary and occur within a very extensive offshore area meaning an impact on breeding populations is unlikely. The Applicant assessed two matters that could possibly cause an impact:

- Changes in water quality due to increased suspended sediment concentrations and the effect that this may have on the fish fauna; and
- An increase in underwater noise levels associated with piling works and general construction activity (e.g. vessel movements) and the impact that this may have on fish species of importance as a prey resource to seabirds.

7.32 No gannets were identified by the Applicant within the surveys of the intertidal cable landfall area. Concerning the export cable corridor, the total area over which increased suspended sediment concentration and subsequent sediment deposition may arise is very small in comparison to the wider distribution of the principal fish species. The sediment transport modelling work undertaken indicates that, even for a worst case scenario, increases in suspended sediment concentration would be unlikely to give rise to biologically significant effects. Increased suspended sediment concentration generated during cable laying operations would be of a temporary nature and adult and juvenile fish (including sandeels) would be able to avoid any areas of increased suspended sediment and temporarily use undisturbed areas adjacent to the cable corridor.

7.33 With regard to underwater noise, whilst it is recognised that construction activities during the Project construction may lead to localised avoidance reactions in fish, there is no evidence to suggest that such effects would have an adverse impact on either the abundance or distribution of fish within foraging areas used by seabirds including gannets.

7.34 NE did not comment on this assessment by the Applicant. **The SoS, agrees with the Applicant's conclusions that the prey resource available to foraging seabirds within and adjacent to the Project site would not be adversely affected due to the very small, localised and temporary impact from construction within an extensive offshore area. Therefore, he concludes that habitat loss will not have an adverse effect upon the integrity of the Flamborough and Filey coast site**. This impact is not considered further within this report.

Disturbance/ displacement – alone and in combination

7.35 The main sources of disturbance and displacement (IfAA report) during operation would be associated with the presence of the wind turbines and regular maintenance undertaken by the Operations and Maintenance team which will require vessel and/ or helicopter movements and associated human activity.

7.36 The northern gannet breeding season foraging ranges and the species' wintering range are large meaning the impacts on designated populations of the loss of habitat associated with any one project in the Dogger Bank zone are expected to be minimal (Furness, 2013). However, while relative to the foraging ranges and the species' wintering range the amount of habitat from which

birds may be displaced by a single project might be considered minimal for this species, the impacts of cumulative developments may be significant if many are located in high quality habitat.

7.37 The Applicant proposed for gannet a potential displacement related mortality rate of 0% for the Project alone and 5% for their assessment of the cumulative impacts of the project in combination with other wind farm projects. This was disputed by NE in their written representation as they did not agree with the Applicant's approach and thought a 5% displacement related mortality rate should inform assessments of the project alone and in combination with other projects.

7.38 Natural England in their final supplementary ornithological expert report found as a precautionary worst case, an estimated mortality of five and four gannets per annum for the Project and Teesside respectively. These are additional nine gannets to the predicted collision total of 342.7 (351.7) but would not exceed the PBR threshold at *F* = 0.4.

7.39 **The SoS agrees with NE and the Applicant in this matter and concludes that gannet mortality due to displacement will not have an adverse effect upon the integrity of the Flamborough and Filey coast site when considered in combination with collision effects as the PBR thresholds would not be reached by the total mortalities.**

Kittiwake

7.40 As with the gannets, a likely significant effect upon the kittiwake interest feature 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, habitat loss and disturbance. Regarding habitat loss and the impact on prey resource the impact assessment is the same for gannets (7.30- 7.34 above) and this is not considered further.

7.41 Displacement could occur to kittiwake in a similar manner to that discussed above for gannet. The Applicant has predicted no displacement impacts on kittiwake and NE have not raised this possible impact as an issue during the examination it is therefore not considered further within this report.

Operational Collision Risk

7.42 NE concludes in their supplementary ornithology report that there would be no adverse effect for the project alone or in combination under all scenarios including basic Band model options 1 and 2, and at all avoidance rates of 98%, 99%, and 99.5%.

7.43 The mean maximum foraging range estimate for kittiwake is 60km and the maximum range is estimated to be 120km (Thaxter et al. 2012) the Applicant also suggested a maximum of 230km taken from FAME (2012) data which indicated larger maximum foraging ranges. The location of the Project is proposed at least 130km from the pSPA, and this is the closest kittiwake breeding colony.

7.44 The RIES reports the Applicant's apportioning of the annual collision estimate during the breeding season attributes a collision loss of 90 adults (90.34) representing 0.1% of the SPA population. For non-breeding birds (summer and winter), 19 birds (18.89) lost through collision are attributed

this SPA, representing 0.01% of the designated SPA population (Table 6.32 of the IfAA Report). In total the loss of adult birds through collision to this SPA would represent an increase in the background mortality of 2.17%. A PBR of 381 adult birds has been calculated by the Applicant for this species.

7.45 The SoCG between the Applicant and NE agreed an estimate of sustainable mortality threshold for kittiwake within a precautionary range. The PBR annual mortality threshold estimated for the total population of kittiwake was 2,148. The breeding adult components of these estimates were 1,718.

7.46 The Applicant IfAA report found a collision loss of 90 adult breeding birds as a result of operation of the Project is significantly below the PBR threshold calculated for the Flamborough Head and Bempton Cliffs SPA colony and according to the Applicant represents 24% of the available 'harvest' for this species. If collision losses of non-breeding birds attributed to the Flamborough Head and Bempton Cliffs SPA are also included (total of 109 birds), then 29% of the PBR would be reached. It is estimated that the collision losses would increase background mortality by 2.1%, a figure that is not considered to be significant in the context of the longer term sustainability of the black-legged kittiwake population at Flamborough Head and Bempton Cliffs SPA.

7.47 The Applicant has undertaken a review of survival rates for Kittiwake that inform the PBR model, which changed their threshold from 512 to 573 using a *F* value of 0.1. NE does not dispute this review of survival rates. As a caveat to this, NE highlighted that there are around 10 possible outputs from the PVA model, but that said the majority of PVAs developed for kittiwake by the Hornsea Project One OWF also indicate a threshold of around 500 may be appropriate.

Table 7 The Applicant's annual kittiwake annual collisions calculations. Extracted and calculated from the Applicant's IfAA report and ES.

Band option	Band option 2			Applicant (band options 3)		
Avoidance rate	98%	99%	99.5%	99.5%	99%	98%
Total annual collision risk estimates at the Project site	1307	654	327	54	109	217
Flamborough & Filey Coast pSPA				27.25 (calculated)	54.5 (calculated)	109

PBR = 512 - 573 (Applicant's figure in NE's written response to deadline V) with a *F* factor of 0.1

7.48 NE was concerned about some of the parameters used by the Applicant including the use of the extended band model 3. This view was shared by the RSPB. NE has used a 0.1 *F* value for kittiwake at the site level and 0.2 at the North Sea scale. However following further assessment by the Applicant (Deadline VI Appendix 4) NE accepted that there would be no adverse effect for the project alone under all scenarios and at all avoidance rates of 98%, 99%, and 99.5% (Panel report).

In combination

7.49 NE in their final supplementary ornithological expert report also found no adverse effect for the Project alone and in combination under all scenarios. For the projects considered in combination with this wind farm Project NE also noted other considerations namely:

- East Anglia ONE, Triton Knoll, Dudgeon offshore wind farm projects contributing to the in combination test may overestimate collisions based on post ES changes to worst case Rochdale envelope project designs. This is included in the Applicant's in combination collision scenario, but not the basic Band model scenarios.
- Apparently precautionary assumptions are made about foraging ranges of kittiwakes, using values of 230 km. Thaxter et al. (2012) estimated a mean maximum foraging range of 60 km, although tracking data from kittiwakes at the Flamborough & Filey Coast pSPA obtained from the RSPB suggest some trips may extend as far as 230 km from the colony. However the bulk of foraging effort does not appear to extend this far offshore.
- No projects that were Tier 5 projects during examination were included in the in combination test (Navitus Bay, Hornsea Project Two, East Anglia 3, East Anglia 4) as there is less confidence in these project's figures, as they had not yet been subject to examination.
- They were not able to include data for Breeveertien II because of a lack of transparency in modelling or AR used – but it is considered very unlikely to contribute anything but negligible mortality to the Flamborough & Filey Coast pSPA given the distance to the colony and the size of the wind farm.

Table 8 Conclusion on predicted in combination kittiwake annual collisions. Extracted from annex 1 of NE's final supplementary ornithological expert report and the Applicant's final kittiwake and gannet in-combination tables.

	Band option 1/ 2			Applicant (band options 1, 2 & 3 where available)
	98% AR	99% AR	99.5% AR	99.5% (for band options 1 & 2 projects); 98% (when projects have used band options 3)
Flamborough & Filey Coast pSPA	392	196	98	74.3

PBR = 512 - 573 (Applicant's figure in NE's written response to deadline V) with a *F* factor of 0.1

7.50 **In agreement with NE and the Applicant the SoS can conclude that predicted Kittiwake morality using a 98% avoidance rate due to collision from the project alone and in combination will not have an adverse effect upon the integrity of the Flamborough and Filey coast site.**

Guillemot and Razorbill

Alone and in combination

7.51 The latest (2013) bird counts at the Flamborough and Filey Coast pSPA were recorded as being 41,607 common guillemots and 10,570 razorbills. The Applicant and NE considered LSEs due to displacement of these auk species during the examination. Furness *et al* (2013) reported that guillemots and razorbills are relatively prone to disturbance/displacement effects in comparison

with other seabirds. Other likely significant effects listed within the RIES such as collision and habitat loss have already previously been discounted by this report.

7.52 In respect of common guillemot and razorbill, the Applicant and NE did consider that displacement of these birds could cause significant mortality by causing an effective loss of foraging resource. Those auks that are displaced from the wind farm site and the surrounding area are likely to suffer from increased mortality as they will need to compete with other birds for scarcer resources. It is the magnitude of that mortality which will determine whether the project will result in an adverse effect upon the species.

7.53 There is a two-stage process to evaluating the magnitude of the displacement effects. First, it must be determined what proportion of the site's population which will be displaced. Then secondly; the proportion of those individuals that will suffer mortality as a result of density-dependent effects needs to be modelled.

7.54 The Applicant has used two sources of data to estimate the potential levels of displacement and mortality:

- Population data held in individual wind farm project Environmental Statements and Habitat Regulations Assessments.
- Density data from NE seabird Sensitivity Mapping for English territorial waters (WWT and MacArthur Green 2013).

7.55 NE's view is that displacement and associated mortality should be considered as a year on year effect and hence the impacts from different projects should be added together and compared against thresholds derived from models such as PBR and PVA. In the Applicant's summary of its final ornithology position, it sets out the view that this mortality would not be an annual event but that the bird populations would adjust once the Project was operational and this would be a one-off event.

7.56 To address the issues raised by NE and the RSPB, the Applicant provided further analysis which itself was subject to disagreement. Eventually the Applicant and NE reached a point in the Examination where their respective positions were maintained and this is set out in the summary of the final ornithology position.

Table 9 Predicted annual guillemot and razorbill displacement mortality and population impacts for the Project alone at Flamborough Head and Bempton Cliffs SPA (source: Applicant's IfAA report table 6.25 & 6.22).

SPA and bird	**50% displacement**			**40% displacement**			**30% displacement**		
	10% mortality	5% mortality	Population % impact (10% mortality)	10% mortality	5% mortality	Population % impact	10% mortality	5% mortality	Population % impact
Flamborough Head & Bempton Cliffs SPA – guillemots breeding & non-breeding	256	128	0.26	206	193	0.2	156	78	0.16
Flamborough Head & Bempton Cliffs SPA – razorbill breeding & non-breeding	54	27	0.18	44	22	0.14	33	17	0.11

7.57 During the examination NE were concerned about the methodology to assess displacement impacts. NE's concern was that a fixed rate of displacement across all buffers out to 2km should be applied for these species. The Applicant had applied declining displacement rates within their IfAA report. However following discussion and agreement on methodology the Applicant submitted a further assessment (tables in Applicant's report Appendix 7 deadline V1). NE was then able to conclude no adverse effect on the SPA from the project alone or in combination. This conclusion was supported by the Panel report.

7.58 In NE's final supplementary ornithological expert report, they conclude that there would be no adverse effect for the project alone or in combination under all scenarios. These scenarios include assumptions of 70% displacement and 10% mortality that are the upper end of the range of effects NE advise that can be considered. **The SoS has reviewed all this evidence and agrees with the SNCB, Applicant and ExA and has found no adverse effect from the project alone on this SPA.**

Table 10 Conclusions on predicted in combination annual guillemot and razorbill displacement mortality for tiers 1 – 4 projects (source: NE final Supplementary Ornithological Expert Report).

SPA and bird	70% displacement		50% displacement		30% displacement	
	10% mortality	5% mortality	10% mortality	5% mortality	10% mortality	5% mortality
Flamborough and Filey Coast pSPA - guillemots	875	437	625	312	375	187
Flamborough and Filey Coast pSPA - razorbill	364	182	260	130	109	78

7.59 Using the figures in the table above, as per Hornsea Project One offshore wind farm, a PBR of at *F* = 0.3 is 970 breeding guillemots and 364 breeding razorbills. The Applicant`s final in combination assessment (shaded in the table above) indicated that the annual mortality due to displacement effects could be up to 312 guillemots and 130 razorbills, assuming a 50% displacement level resulting in a 5% mortality rate. NE advised that the worst case annual mortality rate could be up to 875 guillemots and 364 razorbills taking a 70% displacement level and a 10% mortality rate. The Applicant remained firm in their view that displacement mortality should not be viewed as an annual effect, but a one-off affect. NE did not agree with this view however they did support the Applicant's assessment approach (treating the effect as a year on year impact, assessed using a population model) and pioneering efforts to quantify displacement mortality across all of the relevant North Sea projects *(*NE final Supplementary Ornithological Expert Report).

7.60 The range of assessments provided by the Applicant for the project alone and in combination with other plans and projects was sufficient to demonstrate that even the predicted worst case scenarios are below NE's and the Applicant's estimated PBR values. On this basis, NE was satisfied that the displacement mortality impacts upon guillemots and razorbills from the Project

alone and in combination would not have an adverse effect upon the integrity of the Flamborough and Filey Coast pSPA. This conclusion was supported by the ExA.

7.61 The SoS has considered all of the representations made regarding the potential impacts resulting from the Project alone on guillemots and razorbills. He is satisfied with the range of displacement scenarios and mortality rates produced by the Applicant and NE, even though he notes that many assumptions about behaviour were not agreed with NE and the RSPB.

7.62 Given the lack of agreement about which of the modelling assumptions is most appropriate to use to predict displacement mortality, the SoS is satisfied that the use of a range of estimates is an appropriate method to characterise the predicted mortality rates.

7.63 All of the predicted mortality rates in Tables 9-10 are below the upper level which can be sustainably removed without affecting the population in the long term. **In agreement with NE and the Applicant, the SoS concludes that predicted guillemot and razorbill mortality due to displacement will not have an adverse effect upon the integrity of the Flamborough and Filey coast site.**

Fulmar

7.64 The fulmar (*Fulmarus glacialis*) population of Flamborough and Filey Coast pSPA is estimated as being 1447 pairs (2008-2011 count). Fulmar is one of the most common species of seabird in the North Atlantic, and widely distributed throughout the North Sea in all months (Tasker et al. 1986). The fulmar population is designated as part of the breeding bird assemblage of the pSPA and is potentially at increased risk of collision and displacement impacts from the Project. The peak population estimates for the Project in 2010 and 2011 were 965 birds (90% confidence intervals of 764 to 1,187) in May and 332 birds (90% confidence intervals of 258 to 415) in October respectively (IfAA).

7.65 The Applicant's IfAA found that the number of fulmar colliding with turbines is predicted to be less than one bird per year. They also assigned displacement or mortality value is taken as 0%. So did not identify a LSE from collision or displacement for this species.

7.66 It is unlikely that the Project would act as a significant barrier to the foraging movements of breeding seabirds (IfAA). Up to 3.7% of the fulmar SPA population might be potentially influenced by the barrier posed by the Project. On the basis of the mean maximum foraging range of this species, the potential deviation to the direct flight line would represent 6.3%. It is considered unlikely by the Applicant that the relatively small increases in flight distance that could be incurred by birds flying in a direct line from the breeding colony would adversely affect the energetics of individuals, such that an effect at the population level would arise. This is particularly so given:

- Birds may be able to alter their flight routes from the colony to take account of the presence of the wind farm and, therefore, avoid the additional energetic cost that flying around the wind farm would incur;

- For accomplished and effective fliers the small increase in flight distance may not equate to equivalent energy losses; and
- Birds may combine shorter foraging flights with longer ones that extend beyond the wind farm. In this respect, it is notable that the average foraging range for fulmar is 48km. Thus, not all foraging flights would be subject to a barrier effect and the deviation to the flight line posed by the project is, therefore, likely to be significantly less than 6.3% of the total distance of all flights.

7.67 Given the above, the Applicant considered unlikely that the potential barrier effect posed by the Project would adversely affect the energetics of individual birds originating from the SPA, such that an effect at the population level would arise.

7.68 There are considerable uncertainties and difficulties in assessing the in combination barrier effects posed by offshore wind farms. The in combination assessment by the Applicant was therefore limited to determining the combined impact of the two projects located within the Dogger Bank Zone (the Project and Dogger Bank Teesside A & B). The estimated deviation to flight distance posed by the combined projects is the same. The conclusions reached for the Project alone in respect of breeding fulmar populations therefore also apply to the Project and Dogger Bank Teesside A & B in combination.

7.69 The overall conclusion is that, the Project would not exert an appreciable barrier effect, such that detrimental impacts on designated populations at individual SPAs would arise. No adverse effect on the integrity of those SPAs and their designated populations for which a barrier effect has been identified is therefore predicted.

7.70 The Project was identified in the RIES as having a likely significant effect impacting on the species. However, the Applicant has not predicted any likely significant impacts (IfAA) for the fulmar that would result in an adverse effect upon the integrity of the Flamborough and Filey Coast pSPA. This species was not considered as a species of concern by NE during the examination (Annex F - Section 6.5 of Natural England's Written Representation, NE final). Given the consensus reached between all the parties about the lack of predicted impacts upon the fulmar populations, **the SoS is satisfied that the Project, when considered alone and in combination with other plans and projects, will not result in an adverse effect upon the integrity of the Flamborough and Filey Coast pSPA as a result of impacts on the fulmar feature.**

Flamborough Head and Bempton Cliffs SPA

8.0 As discussed in paragraphs 6.1 to 6.5, a decision is currently pending by the SoS Department for Environment, Food and Rural Affairs (Defra) as to whether the original Flamborough Head and Bempton Cliffs SPA should subsumed into a new designation (the Flamborough and Filey Coast pSPA) which covers a wider area and adds more species onto the SPA citation.

8.1 The assessment for the Flamborough and Filey Coast pSPA (in Section 7.0) has considered in detail all of the impacts expected to affect the interest features for the original Flamborough Head and Bempton Cliffs SPA. The designated interest features of the SPA are:

- Kittiwakes
- Breeding assemblage (gannet, guillemot, razorbill, puffin, herring gull)

Table 11 Conservation objectives for the Flamborough Head and Bempton Cliffs SPA.

Conservation Objectives	Avoid the deterioration of the habitats of the qualifying features, and the significant disturbance of the qualifying features, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the Birds Directive. Subject to natural change, to maintain or restore: ➢ The extent and distribution of 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 distribution of the qualifying features within the site The qualifying features to which the conservation objectives refer are: ➢ Black-legged kittiwake (*Rissa tridactyla*) (breeding) ➢ Northern gannet (*Morus bassanus*) ➢ Seabird assemblage

8.2 The RIES summarises NE's advice on how this site should be assessed. It states that in response to Question 43 of the ExA's first round questions, NE explained that the Flamborough and Filey Coast pSPA, supersedes the Flamborough Head and Bempton Cliffs SPA. NE subsequently confirmed in its written summary of its oral case during the first HRA issue specific hearing on 4 April 2014 that pSPAs are to be dealt with in exactly the same manner as SPAs and therefore NE did not feel it was necessary to consider both sites separately and hence NE only gave consideration to the pSPA. The Applicant provided separate screening and integrity matrices for the Flamborough Head and Bempton Cliffs SPA and the Flamborough and Filey Coast pSPA on 19 May 2014.

8.3 Given the overlap of interest features between the 2 sites, there is no requirement to repeat the assessment of the impacts of the Project for the features of the Flamborough Head and Bempton Cliffs SPA. For a detailed assessment of the impacts, please refer to section 7.

8.4 **On the basis of the analysis and conclusions reached in section 7, the SoS 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 Flamborough Head and Bempton Cliffs SPA.**

Farne Islands SPA

9.0 The Farne Islands are a group of rocky offshore islands and stack located between 2-6 km off the Northumberland coast. The site's citation[4] describes them as islands formed of quartz dolerite, making them stable, the most easterly outcropping of the Great Whin Sill, has some capping of boulder clay and peaty soils on certain islands. However the vegetation is poor and mostly limited to pioneer communities. The islands are an important breeding ground for grey seals and seabird nesting colonies, especially terns, gulls and auks. The seabirds feed outside the SPA in the nearby waters, as well as more distantly in the North Sea.

Table 12 Conservation objectives for the Farne Islands 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 (Subject to natural change, to maintain or restore);** ➢ The extent and distribution of 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: ➢ Sandwich tern *Sterna sandvicensis* (Breeding) ➢ Common tern *Sterna hirundo* (Breeding) ➢ Arctic tern *Sterna paradisaea* (Breeding) ➢ Seabird assemblage

9.1 The RIES highlights that the Applicant's conclusion on the Project's impact on this European site's integrity have not been disputed during the examination. The RIES indicated that there was an LSE on this site because of increases in collision risk, habitat loss and disturbance impacting on common guillemot, Atlantic puffin and black-legged kittiwake assemblage features as a result of the Project alone and in combination with other plans and projects.

Kittiwake

9.2 Kittiwakes were identified as part of the assemblage at this SPA by the 2001 SPA review (Stroud *et al*. 2001). The Project is within maximum foraging range of the Farne Islands SPA. The breeding population of the Farne Islands SPA has decreased substantially, by 36%, since designation. The population, based on 2011 data, stood at just under 4,000 pairs. The Applicant within their IfAA report using a 98% avoidance rate, collision risk modelling analysis calculated an estimate of 172 (119 breeding birds and 53 non-breeding birds) collisions per year attributable to all SPA designated populations of this species. The notes for the Flamborough & Filey Coast pSPA kittiwake assessment also apply to this SPA.

9.3 For the Farne Islands, the Applicant's IfAA predicted collision loss during the breeding season of three adult birds which would represent less than 0.04% of the population. Including non-breeding birds (summer and winter), the total collision loss is estimated as less than five birds (0.05% of

[4] http://publications.naturalengland.org.uk/file/5184544386842624 *& http://jncc.defra.gov.uk/page-1990-theme=default*

the SPA population). The change in background mortality is estimated as 0.96% and, given this, it is considered that the loss of up to five adult birds, would not materially affect the population at this site. From the projects included in the in combination assessment the Applicant found only one additional collision mortality is attributed to this SPA, giving a total in combination loss of six birds, representing 0.06% of the SPA population (1.13% increase in background mortality).

9.4 In NE's supplementary ornithological report, they agree a conclusion of no adverse effect for the site for the project alone, and in combination with other plans and projects, under all scenarios including basic Band model options 1 and 2, 98%, 99%, and 99.5% avoidance rates, and the Applicant's predicted collision mortality (which uses the extended Band model and makes some assumptions about effects from other projects in combination). NE in their supplementary ornithological report using the basic Band model report a total of year round collision:

- 98% - 1,307
- 99% - 654
- 99.5% - 327

Table 13 Conclusion on annual kittiwake annual collisions. Figures extracted and calculated from the Applicant's IfAA report and ES.

Band option	Band option 2			Applicant (band options 3)		
Avoidance rate	98%	99%	99.5%	98%	99%	99.5%
Total annual collision risk estimates at the Project site	1307	654	327	217	109	54
Farne Island SPA				5	2.5	1.25

9.5 NE disagreed with the parameters used within the extended Band Model (option 3). They felt that this underestimated the likely collision mortality. In response to this position the Applicant provided further justification that the Band Model option 2 was the preferred model. This argument looked at the discrepancy between flight height bands of the bird data that was collected and the worst case scenario for turbine specification. NE accepted the justification provided by the Applicant (NE written summary 3rd June 2014). The remaining principal areas of disagreement in relation to collision risk methodologies are outlined in table 2 of the Applicant's Summary of final ornithology position.

Table 14 Conclusion on predicted in combination kittiwake annual collisions extracted from Annex 1 of NE's final supplementary ornithological expert report.

	Band option 1/ 2			Applicant (band options 1 & 2)
	98% AR	99% AR	99.5% AR	99.5%
Farne Island SPA	33.2	16.6	8.3	7.07

PBR value = 56 (NE's final supplementary ornithological expert report)

9.6 The Project's impact when considered in combination also did not find an adverse impact on the European site. The Panel's report agrees with NE's final Supplementary Ornithological Expert Report which concludes that they are 'able to agree to a conclusion of no adverse effect on

integrity of the site alone and in-combination under all scenarios' for kittiwake at the Farne Islands SPA (i.e. under basic and extended Band Model options).

9.7 **The SoS agrees with the ExA, NE and the Applicant in relation to this matter and concludes that predicted Kittiwake mortality due to collision will not have an adverse effect upon the integrity of the Farne Islands SPA.**

Guillemot

9.8 The discussions for guillemots from Flamborough and Filey Coast pSPA also apply to this SPA. During the examination NE raise concerns with the Applicant's conclusions on displacement rates. They did not agree with the methodology used to assess displacement within the site. NE's position remains that a fixed rate of displacement across all buffers out to 2 km should be applied for auk species. The IfAA Report outlines the Applicant's approach in applying declining displacement rates with increasing distance from the wind farm in two bands: 0-1km, 75% of the displacement rate; and 1-2km, 25% of the displacement rate.

Table 15 Predicted annual guillemot and razorbill displacement mortality and population impacts for the Project alone at Farne Islands SPA (source: Applicant's IfAA report table 6.22).

	50% displacement			**40% displacement**			**30% displacement**		
	10% mortality	5% mortality	Population % impact at 10% mortality	10% mortality	5% mortality	Population % impact	10% mortality	5% mortality	Population % impact
guillemots breeding & non-breeding	126	63	0.16	102	51	0.12	76	38	0.1

9.9 However, following discussion and new assessment by the Applicant NE's in their final Supplementary Ornithological Expert Report also agrees a conclusion of no adverse effect alone and in combination with other plans and projects under scenarios including assumptions of 70% displacement and 10% mortality at the upper end of the range of effects NE advise that can be considered.

Table 16 Conclusions on predicted in combination annual guillemot displacement mortality for tiers 1 – 4 projects (source: NE final Supplementary Ornithological Expert Report).

	70% displacement		**50% displacement**		**30% displacement**	
	10% mortality	**5% mortality**	**10% mortality**	**5% mortality**	**10% mortality**	**5% mortality**
guillemots	638	319	455	228	273	137

PBR threshold at *F* = 0.3 is 782 (breeding adult *Nmin* = 67,064 adjusted to 61,648 to account for 10% count error; adult survival = 0.946 (BTO Bird Facts); age at first breeding = 5).

9.10 The in combination figures used by NE predict that the displacement mortality impacts would not adversely affect guillemots from the Farne Island population even at the most precautionary of models. **The SoS agrees with the ExA, NE and the Applicant in relation to this matter and concludes that predicted Guillemot mortality due to displacement from the project alone or in combination with other plans/ projects will not have an adverse effect upon the integrity of the Farne Islands SPA.**

Puffin

9.11 Puffin population numbers on the Farne had increased steadily until 2003, at which point the population declined. However post 2012 population figures have shown a slight upward trend in breeding pair numbers (NE's final supplementary ornithological expert report). No significant collision or displacement risk was identified for this species by Natural England (NE's final supplementary ornithological expert report). Barrier effects were not considered as an issue of ornithological concern by NE (written representation 17th March 2014).

9.12 The RIES identifies a likely significant effect for displacement for puffin *Fratercula arctica* from the project alone and in combination with other projects and plans. Population numbers for this species increased steadily until 2003, but has been steadily declining since. Natural England also reports that post-2012 population figures have shown a slight upward trend in breeding pair numbers. The Farne Islands support 14,000 pairs of breeding puffins. Furness *et al* (2013) reported that puffins (and other auk species) are relatively prone to disturbance/displacement effects in comparison with other seabirds.

9.13 A precautionary displacement rate of 50% and mortality rate of 5% has been defined for Atlantic puffin in the Applicant's IfAA Report. A precautionary mortality rate of 5% has been assigned to this species based on knowledge of the foraging ecology of this species and the magnitude of the habitat loss that could occur as a result of displacement from within the site of the operational wind farm development. Based on 2010 and 2011 data, the disturbance and displacement analysis undertaken provides a mean of 294 displaced birds (all non-breeders). Therefore, in total, the Applicant finds a predicted mortality of 15 birds as a result of displacement from the wind farm area.

9.14 From the Applicant's IfAA Report in total, this species is a feature of 16 SPAs situated around the North Sea. The Project is outside the mean maximum foraging range during the breeding season of any SPAs supporting qualifying populations of this species. Apportioning this small number of birds across the 16 SPAs situated around the North Sea (as no SPAs are within foraging range) suggests that less than 1 bird per SPA would be affected. Displacement-led mortality would affect less than 0.01% of the total population of the suite of protected sites around the North Sea at which the species is a feature. Displacement would affect much less than 0.01% of the British breeding population and the species' biogeographic population.

9.15 For the in combination assessment the Applicant used predictions of the numbers of birds potentially displaced by other projects were available for three additional projects – Dogger Bank Teesside A & B, European Offshore Wind Development Centre (EOWDC) and Thanet. The cumulative number of birds estimated by the Applicant to be displaced across these projects was 747. Of these estimates of the numbers of displaced birds that might be expected to die were available for the Project, Dogger Bank Teesside A & B and EOWDC, with a predicted total of 87 birds. Of these 52 birds are attributed to the EOWDC project (at a 100% mortality rate). The displacement and mortality rates applied to the Dogger Bank Teesside A & B project were the same as those applied for the Project.

9.16 Apportioning of the affected birds to individual SPAs was not undertaken for EOWDC and is therefore only available for the Project and Teesside A & B. The Applicant concluded that the relatively small number (25) of puffin affected by both the Project and Dogger Bank Teesside A & B results in near zero percentage impact on relevant SPA populations. Essentially this also means that the overall potential contribution to any in combination impact of the Project on the designated populations of Atlantic puffin would always remain at a negligible level. It is, considered unlikely, on the basis of the precautionary values adopted here, that displacement effects would have any consequences for SPA designated Atlantic puffin populations.

9.17 **NE did not find any LSEs on this feature and judged impacts on designated population to be minimal. The RIES and the Applicant also found not adverse impact on the integrity of this feature from the Project. The SoS concludes that predicted impacts on puffins from the Project alone and in combination with other projects will not have an adverse effect upon the integrity of the Farne Islands SPA.**

Forth Islands SPA

10.0 The Forth Islands are located in or near to the Firth of Forth on the east coast of central Scotland[5]. The SPA comprises a series 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. The inner islands are very low lying whilst those in the outer Firth are higher, steeper and rockier. This applies especially to the Bass Rock which is a volcanic plug rising to over 100 m, and to the Isle of May, which is surrounded by cliffs up to 50 m. The islands support important numbers of a range of breeding seabirds, in particular terns, auks and gulls. The colony of Gannets *Morus bassanus* is the largest on the east coast of the UK. The island of long Craig supports the largest colony of roseate tern *Sterna dougallii* in Scotland. It is the most northerly of only six regular British colonies. The seabirds feed outside the SPA in nearby waters, as well as more distantly in the North Sea.

10.1 The boundary of the SPA overlaps with the boundaries of the following SSSIs: Long Craig, Inchmickery, Forth Islands, Bass Rock and the Isle of May, and the seaward extension encompasses an extra (approximately) 2 km of the marine environment to include the seabed, water column and surface.

[5] *http://jncc.defra.gov.uk/page-1970*

Table 17 Conservation objectives for the Forth Islands SPA.

Conservation Objectives	To avoid deterioration of the habitats of the qualifying species 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 ➢ Structure, function and supporting processes of habitats supporting the species ➢ No significant disturbance of the species 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: ➢ Puffin *Fratercula arctica* ➢ Lesser black-backed gull *Larus fuscus* ➢ Gannet *Morus bassanus* ➢ Shag *Phalacrocorax aristotelis* The area 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).

10.2 The site is 265km from the Project at the nearest point. The RIES originally found LSEs for gannet, puffin, kittiwake, guillemot, fulmar, razorbill and lesser black-backed gull. The RSPB was concerned about the Applicant's conclusion on no adverse effect on gannet and puffin as breeding species and kittiwake, guillemot and razorbill as breeding assemblage species. Scottish Natural Heritage (SNH) and JNCC have concluded (email of the 15th April 2014) no LSE with regards to northern gannet, common guillemot and razorbill associated with any Scottish SPA. This report therefore does not further consider these species. The ExA also highlights that the email also states that SNH is content that JNCC's advice has covered potential breeding season effects on seabirds from Scottish SPAs adequately, and that it is content for the applicant to follow NE's recommendations in relation to impact assessment in the non-breeding season.

10.3 During the examination NE maintained its position that it is not the remit of NE to provide advice on Scottish SPAs. However, NE was satisfied that SNH are aware of the issues raised and advised that SNH were content to follow NE's advice on in combination effects. SNH advised NE that they have nothing further to add to the advice of NE. SNH did not raise any issues and did not seek to add any additional requirements to the DCO (from the RIES).

10.4 The SoS has looked at LSEs on puffin kittiwake, fulmar and lesser black-backed gull in more detail due to the discussion on these species during the examination. However the views of the SNCB have also been taken into account.

Puffin

10.5 The RIES identifies a LSE for displacement for puffin from the project alone and in combination with other projects and plans. The general discussions for puffin and the Farne Islands SPA also apply to this SPA. The Applicant's IfAA report found that the Project is outside the mean

maximum foraging range during the breeding season of any SPAs supporting qualifying populations of this species. Therefore any attributed losses relate to non-breeding birds only. Displacement-led mortality attributed to this SPA would affect less than 5 birds being lost from the population, which is 0.01% of the total population. This predicted magnitude of impact is not considered to be significant at the population level and not result in an adverse effect on the integrity of SPAs designated for their puffin populations.

10.6 The Applicant also considered mortality losses resulting from displacement in combination with other projects (see earlier sections *9.15- 9.17*). The relatively small numbers of puffin affected by both the Project results in near zero percentage impact on relevant SPA populations. Therefore any contribution from the Project would always remain at a negligible level. The RSPB's written representation originally considered that the Applicant did not provided sufficient evidence to conclude no adverse effect from displacement of Atlantic puffin, during the construction and operation of the Project. Within the RSPB's response to Q10 of the ExA's second written questions they did not provide further comments on any aspect of the Forth Islands SPA.

10.7 **Given the very small population impact for all SPA populations assessed it is concluded that alone and in combination with other projects displacement impacts would not constitute an adverse effect on the Forth Islands SPA.**

Kittiwake

10.8 The RIES identifies a LSE for collision risk for kittiwake from the project alone and in combination with other projects and plans. The notes for the Flamborough & Filey Coast pSPA kittiwake assessment also apply to this SPA. Within the Applicant's IfAA report appendix D considered the Project site and assuming a 98% avoidance rate, found the total number of collisions predicted based on mean population estimates for 2010 and 2011 data is 217 birds. Of these collisions 172 are assigned to the suite of SPAs considered in the assessment (119 breeding and 53 non-breading birds). The Project is outside the maximum foraging range of black-legged kittiwake that could derive from this SPA (RIES). Apportioning of the annual collision estimate therefore relates to non-breeding birds (summer and winter), with <2 birds being attributed to this SPA, representing 0.01% of the designated SPA population and an increase in background mortality of 0.23%. This predicted magnitude of impact is not considered to be significant at the population level.

10.9 The Applicant also assessed the Project in combination with other plans and projects. The data on predicted collision estimates for black-legged kittiwake were available for nine additional projects, Teesside A and B, Beatrice, the European Offshore Wind Development Centre, Galloper, Humber Gateway, Teesside, Thanet, Triton Knoll and Westermost Rough. The cumulative collision estimate for black-legged kittiwake is estimated as 1,003 birds per year from these projects. The predicted non-breeding bird collision losses across all of the other SPAs screened into the assessment is 0.01% of SPA populations (0.23% increase in background mortality). This indicates that any contribution of collision losses due to operation of the Project would be non-significant cumulatively with collision losses attributed to this SPA from other projects.

10.10 The Applicant found that the losses of black-legged kittiwake that could occur as a result of collision would not have any consequences at population levels, both for the Project alone and in combination with other assessed plans and projects. They therefore concluded that there was no adverse effect on the integrity on this feature of the Forth Island SPAs designated for this species would arise.

10.11 **Given the very small impact for kittiwake it is concluded that alone and in combination with other projects collision impacts would not constitute an adverse effect on the Forth Islands SPA.**

Fulmar

10.12 The RIES identifies a LSE for fulmar from the project alone and in combination with other projects and plans. It is however unlikely that the Project would act as a significant barrier to the foraging movements of breeding seabirds. Fulmar were identified to have a greater than 1% of the breeding population at individual SPAs which could potentially be affected. It was considered however by the Applicant that it is unlikely that the relatively small increases in flight distance that could be incurred by birds flying in a direct line from the breeding colony would adversely affect the energetics of individuals, such that an effect at the population level would arise. This is particularly so given:

- Birds may be able to alter their flight routes from the colony to take account of the presence of the wind farm and, therefore, avoid the additional energetic cost that flying around the wind farm would incur;
- For accomplished and effective fliers the small increase in flight distance may not equate to equivalent energy losses; and
- Birds may combine shorter foraging flights with longer ones that extend beyond the wind farm. In this respect, it is notable that the average foraging range for fulmar is 48km.

Thus, not all foraging flights would be subject to a barrier effect and the deviation to the flight line posed by the Project is, therefore, likely to be significantly less than 6.3% of the total distance of all flights.

10.13 The Applicant's IfAA assessed the predicted collision mortality for fulmar using monthly population estimates for both 2010 and 2011. A precautionary avoidance rate of 98% (SNH, 2010; Cook et al. 2012) has been utilised in the assessment for all species. The number of fulmar colliding with Project turbines is predicted to be less than one bird per year. They considered that the predicted very low number of annual collisions for these species would be highly unlikely to have a discernible effect at the population level, either with regard to individual designated site-based populations or wider North Sea populations. On the basis of the modelling undertaken it is therefore concluded that collision mortality during operation of the Project would not result in an adverse effect on the integrity of SPAs designated for their northern fulmar. Due to this low number no assessment of in combination collision impacts for these species was considered necessary.

10.14 **Given the very small impact for fulmar it is concluded that alone and in combination with other projects collision or barrier impacts would not constitute an adverse effect on the Forth Islands SPA.**

Lesser black-backed gull

10.15 The Applicant's IfAA assessed that the Project is outside the foraging range of any protected sites designated for breeding populations of lesser black-backed gull. Considering the Project alone and using an avoidance rate of 98% an annual collision total of 34 birds, based on a mean of 2010 and 2011 data, was attributed to the suite of SPAs. Predicted losses of lesser black-backed gull from all SPAs screened into the assessment process would represent less than 0.01% of designated populations and less than a 0.1% increase in background mortality for this species. Given the relatively small number of birds involved apportioned across all of the relevant SPAs this level of loss is not considered to have an adverse effect on the integrity of SPAs screened into the assessment for their designated lesser black-backed gull populations. The calculated small population impact for those SPAs examined indicates that any contribution of collision losses due to operation of the Project would be negligible in combination with collision losses attributed to any other projects. Consequently, it is concluded that no adverse in-combination effect on the integrity of lesser black-backed gull populations of the SPAs screened into the assessment would arise.

10.16 The Applicant's assessment for the Forth Island of the annual collision estimate found a loss of <1 bird apportioned to this SPA (0.01% of the SPA population and an increase in background mortality of 0.09%). This assessment only includes non-breeding birds (summer and winter) as the foraging range of breeding birds did not reach this SPA. The predicted magnitude of impact is considered to be negligible. They also considered that the very small collision loss attributed to this SPA indicates that any contribution of lesser black-backed gull collision losses during the operation of the Project would be non-significant when combined with collision losses attributed to Dogger Bank Teesside A & B or any other project, and no in-combination impact would arise.

10.17 **The SoS has carefully considered all of the information presented on potential impacts from the Project on the Forth Islands SPA, before and during the Examination. This includes representations made by Interested Parties, the RSPB and the ExA's report itself. The SoS considers that the Project, when considered both alone and in combination with other plans and projects, will not have an adverse effect on the integrity of the Forth Islands SPA.**

Habitats Regulations Assessment Conclusions

11.0 The SoS has carefully considered all of the information presented before and during the Examination, including the ES, the Applicant's IfAA and clarification notes, representations made by Interested Parties, and the ExA's report itself. He considers that the Project has the potential to have an LSE on five European sites when considered alone and in combination with other plans and projects. These are as set out in *Table 1* and comprise sites in England and Scotland. The sites are:

- Dogger Bank cSAC and SCI
- Farne Islands SPA
- Flamborough Head and Bempton Cliffs SPA
- Flamborough and Filey Coast pSPA
- Forth Islands SPA

11.1 The SoS is confident that, with the mitigation measures in the DCO and Deemed Marine Licence conditions, the MMO's functions under the Marine Licences and Part 4 of the Marine and Coastal Access Act 2009 and the SoS's functions under the DCO and Part 2 of the Energy Act 2004, there will be no adverse effect on the integrity on any of these sites.

11.2 Mitigation for the Project will be secured and delivered through the DCO within:

articles:

- article 11 Offshore works: abandonment, decay or removal.

Requirements:

- Requirement 3 Detailed offshore design parameters;
- Requirement 4 Detailed offshore design parameters;
- Requirement 5 Detailed offshore design parameters;
- Requirement 6 Detailed offshore design parameters;
- Requirement 10 Offshore Decommissioning;
- Requirement 33 Amendments to approved details.

Deemed Marine Licence Conditions:

Deemed Marine Licence 1 & 2

- Condition 3 Detailed offshore design parameters;
- Condition 5 Layout rules
- Condition 7 Chemicals, drilling and debris;
- Condition 9 Pre-construction plans and documentation;
- Condition 14 Pre-construction monitoring;
- Condition 15 Construction monitoring;

- Condition 16 Post construction surveys;
- Condition 17 Post-construction maintenance plan.
- Condition 25 Amendments to plans, etc.

Deemed Marine Licence 3 & 4

- Condition 3 Detailed offshore design parameters;
- Condition 4 Layout rules;
- Condition 6 Chemicals, drilling and debris;
- Condition 8 Pre-construction plans and documentation;
- Condition 13 Pre-construction monitoring;
- Condition 14 Construction monitoring;
- Condition 15 Post construction surveys;
- Condition 16 Post-construction maintenance plan.
- Condition 24 Amendments to plans, etc.

11.3 The SoS has undertaken an appropriate assessment in respect of those 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 upon the sites' integrity.

11.4 **The SoS has determined that the Dogger Bank Offshore Wind Farm will not have an adverse effect upon the sites' integrity either alone or in combination with other plans or projects. He has undertaken a robust assessment using all of the information available to him, not least the views of the various Interested Parties.**

Transboundary Assessment

12.0 Given the potential for this Project to affect mobile features across a wide geographical area (as identified within the RIES); the SoS believes it important to consider the potential impacts on European sites in other EU Member 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 SoS own views on this matter are presented below.

12.1 The Applicant identified an extensive list of European sites to be considered. There were:

- 27 sites in Germany,
- 33 in the Netherlands,
- 6 in Belgium,
- 32 in Denmark,
- 28 in Sweden,
- 22 in France, and
- 2 in Norway.

The Panel's report notes that the Applicant has concluded no LSE, or Adverse Effect on the integrity for all non-UK European Sites. This conclusion is not challenged and no representations have been received relating to any non-UK sites.

Table 18 Screening of Likely Significant Effect for transboundary SAC Sites from the Applicant's HRA screening report.

Special Area of Conservation site	country	Site feature screened in	Likely Significant Effect (LSE)	Distance from Project
Doggerbank SAC	Germany	sandbanks which are slightly covered by sea water all the time, and harbour porpoise	Potential for a LSE on designated harbour porpoise populations.	105 km
NTP S-H Wattenmeer und angrenzende Kustengebiete SCI	Germany	Harbour porpoise, and grey seal.	Potential for a LSE on the designated grey seal and harbour porpoise populations.	370 km
Borkum-Riffgrund (Borkum Reef Ground) SAC	Germany	Harbour porpoise and grey seal.	Potential for a LSE on the designated grey seal and harbour porpoise populations.	270km
Sylter Außenriff (Sylt Outer Reef) SAC	Germany	Harbour porpoise and grey seal.	Potential for a LSE on the designated grey seal and harbour porpoise populations.	270km
Steingrund SCI	Germany	Grey seal and harbour porpoise.	Potential for a LSE on the designated grey seal and harbour porpoise populations.	370km
Helgoland mit Helgoländer Felssockelp SCI	Germany	Grey seal and harbour porpoise.	Potential for a LSE on the designated grey seal and harbour porpoise populations.	350km

Hamburgisches Wattenmeer SCI	Germany	Harbour porpoise.	Potential for a LSE on the designated harbour porpoise population.	400km
Küsten- und Dünenlandschaften Amrumsp SCI	Germany	Grey seal.	Potential for a LSE on the designated grey seal population.	400km
Doggersbank pSCI	Netherlands	Sandbanks which are slightly covered by sea water all the time, grey seal and harbour porpoise.	Potential for a LSE on designated harbour porpoise and grey seal populations.	35km
Klaverbank (Cleaverbank) pSCI	Netherlands	Grey seal and harbour porpoise.	Potential for a LSE on the designated grey seal and harbour porpoise populations.	65km
Noordzeekustzone pSCI	Netherlands	Grey seal and harbour porpoise.	Potential for a LSE on the designated grey seal and harbour porpoise populations.	230km
Noordzeekustzone II pSCI	Netherlands	Harbour porpoise.	Potential for a LSE on the designated harbour porpoise population.	230km
Waddenzee pSCI	Netherlands	Grey seal.	Potential for a LSE on the designated grey seal population.	240km
Vlatke Van der Raan pSCI	Netherlands	Grey seal and harbour porpoise.	Potential for a LSE on the designated grey seal, and harbour porpoise populations.	350km
Trapegeer-Stroombank pSCI	Belgium	Grey seal and harbour porpoise.	Potential for a LSE on the designated grey seal, and harbour porpoise populations.	380km
SBZ 1 / ZPS 1, SBZ 2 / ZPS 2, and SBZ 3 / ZPS 3 pSCI	Belgium	Harbour porpoise and grey seal.	Potential for a LSE on the designated grey seal, and harbour porpoise populations.	400km
Vlakte van de Raan pSCI	Belgium	Harbour porpoise and grey seal.	Potential for a LSE on the designated grey seal, and harbour porpoise populations.	400km
Vadehavet med Ribe Å, Tved Å og Varde Å vest for Varde SCI	Denmark	Harbour porpoise and grey seal.	Potential for a LSE on the designated grey seal, and harbour porpoise populations.	400km
Venø, VenøSundp SCI	Denmark	Harbour porpoise.	Potential for a LSE on the designated harbour porpoise populations.	420km
Kosterfjorden-Väderöfjorden SCI	Sweden	Harbour porpoise.	Potential for a LSE on the designated harbour porpoise populations.	520km

12.2 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 which are all over 35km away, see *Table 18)*. There were only three interest features found to have a potential LSE at all these sites these included sandbanks which are slightly covered by sea water all the time, grey seals and harbour porpoise.

Sandbanks which are slightly covered by sea water all the time

12.3 The Applicant's conclusions for the nearest two sites Doggersbank SCI (Netherlands) and Doggerbank SCI (Germany) were that there would be no adverse effect on the integrity of sandbanks which are slightly covered by sea water all the time feature, on either site. Their assessment has identified that no construction related effects (direct or indirect) would extend to the Doggersbank SCI and Doggerbank SCI, and therefore no impact could arise on the sandbank feature as a result of physical disturbance, increased suspended sediment concentrations or sediment deposition. The assessment of the operation phase was based on the potential long-term hydrodynamic impacts on the subtidal sandbank communities within the SCIs. The assessment indicates that the effects of hydrodynamic changes would be very low in magnitude, and remain within the ranges currently experienced by the species and communities of the subtidal sandbank feature, and to which they are adapted. The assessment also identified (see paragraphs 4.2.135 to 4.2.190 IfAA) that no other operation phase effects (direct or indirect) would extend to the Doggersbank SCI, and there no impact could arise on the sandbank feature as a result of physical disturbance, increased suspended sediment concentrations or sediment deposition.

Grey seals

12.4 Grey seals (*Halichoerus grypus*) populations are a feature of 22 transboundary sites identified at the HRA screening stage. Only the sites nearest to the Project were screened in due to the potential for a LSE from noise and subsequent effects on their respective populations, namely Doggersbank SCI which is adjacent to the eastern boundary of the Dogger Bank Zone (approximately 35km from the eastern boundary of the Project) and Klaverbank SCI which is located some 65km from the southern boundary of the Project. These sites provide foraging grounds for grey seal from colonies located in the Wadden Sea.

12.5 The main risks to grey seals from the Project were considered by the Applicant to be injury or displacement because of the piling works, reductions in prey availability and the potential for collision with vessels (IfAA). The potential impacts upon grey seals will be highly localised around the piling activity (under 150m using 3000 kJ hammer, worst case scenario). There are marine mammal mitigation measures (secured through conditions 9(e) of DMLs 1 and 2 and 8(e) within the DMLs 3 and 4) to ensure that no grey seals are injured by the piling works. As the piling energy is gradually increased, grey seals (if present in the area) will have the opportunity to move away from the source of the sound thereby avoiding injury.

12.6 The piling works, whilst unlikely to injure grey seals, might still be sufficient to cause displacement over a relatively large area. The applicant predicts that displacement of grey seals could occur up to 1.9 km from the piling works (using a hammer energy of 3000 kJ). However, this should not adversely affect the population recognising the distance between the Project and the European sites and given the large extent of alternative foraging areas available to those populations.

12.7 Given the very small numbers of animals present in the Project area at any one time it is apparent that only a very small number (<0.06 based on maximum mean densities) of the overall reference grey seal population would be at risk of instantaneous injury that would cause a permanent threshold shift (PTS). This level of potential impact in respect of risk of PTS is considered negligible. Proposals to undertake soft start to piling and other measures to manage piling activity if marine mammals are within close proximity would further reduce any potential risk of grey seal being affected by instantaneous injury leading to PTS.

12.8 The Applicant found that given the relatively small maximum displacement rate (1.9 km from piling work) predicted for grey seals relative to their typical foraging range (145 km), even if all the offshore wind farms in the North Sea are undertaking concurrent or sequential piling activity that harbour seals from Doggersbank pSCI, and the Klaverbank pSCI will be without sufficient foraging habitat given their diverse diet preferences and foraging range.

12.9 The Applicant identified potential operational impacts as:

- Indirect effects from the alteration to prey species (fish) distribution, abundance or quality arising from the obstruction of the seabed causing a physical loss of habitat and scour induced increase in suspended sediment concentrations in the water column due to the presence and operation of the offshore wind farm structures;
- Indirect effects on the grey seal population as a result of behavioural changes arising from the increase in underwater noise levels due to the operation of the wind turbines; and
- Direct physical damage to grey seal population as a result of collisions with maintenance vessels.

12.10 The Applicant concluded that their assessment showed only an extremely small percentage of the entire grey seal population of the UK North Sea population would be affected in the worst case scenario during the construction and operation of the Project. There is some evidence from tagging studies that there is movement of seals between colonies on the European continental coast (notably in the Wadden Sea) and the UK (Brasseur et al. 2010). This suggests that populations present in the UK and continental Europe are not 'closed' and that the effects of wind farm development in the central North Sea could, therefore, impact upon the wider North Sea grey seal population. If this is the case, then the magnitude of the impacts predicted using the UK North Sea population as a reference, therefore, commensurately would be even lower. The tagging study reported in Brasseur et al. (2010), also shows that grey seals from Dutch colonies make use of the Dogger Bank for foraging.

12.11 The Project would have no direct impacts upon designated supporting habitats for grey seals within transboundary SACs. With regard to indirect effects (notably disturbance during construction and potential prey displacement) the Applicant did not find any impacts. This was similar to their conclusions drawn in respect of grey seals that may originate from UK SACs. Essentially, this conclusion reflects the observed data that grey seals spend the majority of their time at sea within relative proximity to their breeding colonies and would, therefore, are unlikely to be subject to potential effects associated with the Project. Additionally, seals that may be present within Dogger Bank could potentially originate from both UK and continental European sites, or

potentially be in transit between them. With respect to the grey seal populations that forage within the Doggersbank SCI and Klaverbank SCI (which are located 35km and 65km respectively to the Project site), the distance to these sites falls outside the maximum range of potential noise disturbance, therefore no impact on the foraging population of grey seal within these sites is predicted. Only one grey seal tagged from sites outside UK waters (i.e. from a transboundary site) was recorded passing through the Project site. Therefore negligible numbers of grey seal from transboundary sites that may travel through and forage within the Project location and potentially could be affected by disturbance due to noise and alteration to prey species during the construction phase, and to a lesser extent for the operation and decommissioning phases (which result in significantly smaller noise disturbance). However, as described above, given the negligible population level effect, the distance from the Project to these breeding and haul out sites, and the limited use of the Project area, no effect is predicted on these sites.

In combination

12.12 The Applicant predicted no in combination effect on transboundary sites. Their conclusion is supported by observed data that grey seals spend the majority of their time at sea within relative proximity to their breeding colonies. The proportion of the grey seal population at individual colonies spending a significant amount of time foraging in offshore waters at distance from colonies is likely to be small. Grey seals are therefore more likely to be affected by projects that lie within their normal foraging range. Cumulatively, the contribution of foraging effort within Dogger Bank is likely to be very small in comparison to the total effort taking place close to colonies. Given this, the in combination impact of the Project on grey seal populations / colonies is considered to be no greater than that likely to arise with respect to individual projects in closer proximity to sites where this species is a designated feature.

12.13 In respect of the in combination effect of wind farm development, where underwater noise effects associated with piling may be of significance, the work undertaken for the Project was used by the Applicant as an indicator as to the likely cumulative effect with other offshore wind farms. They found only a very small percentage of the overall grey seal population would be at risk of PTS, and taking into account the proposed mitigation measures in the DCO which would minimise any potential risk of grey seal being affected, the risk of PTS is considered negligible. It is considered that similar mitigation would be expected for marine piling for the other wind farm projects. Consequently, the Project in combination with other projects is not predicted to compromise the grey seal populations within the North Sea as a result of PTS.

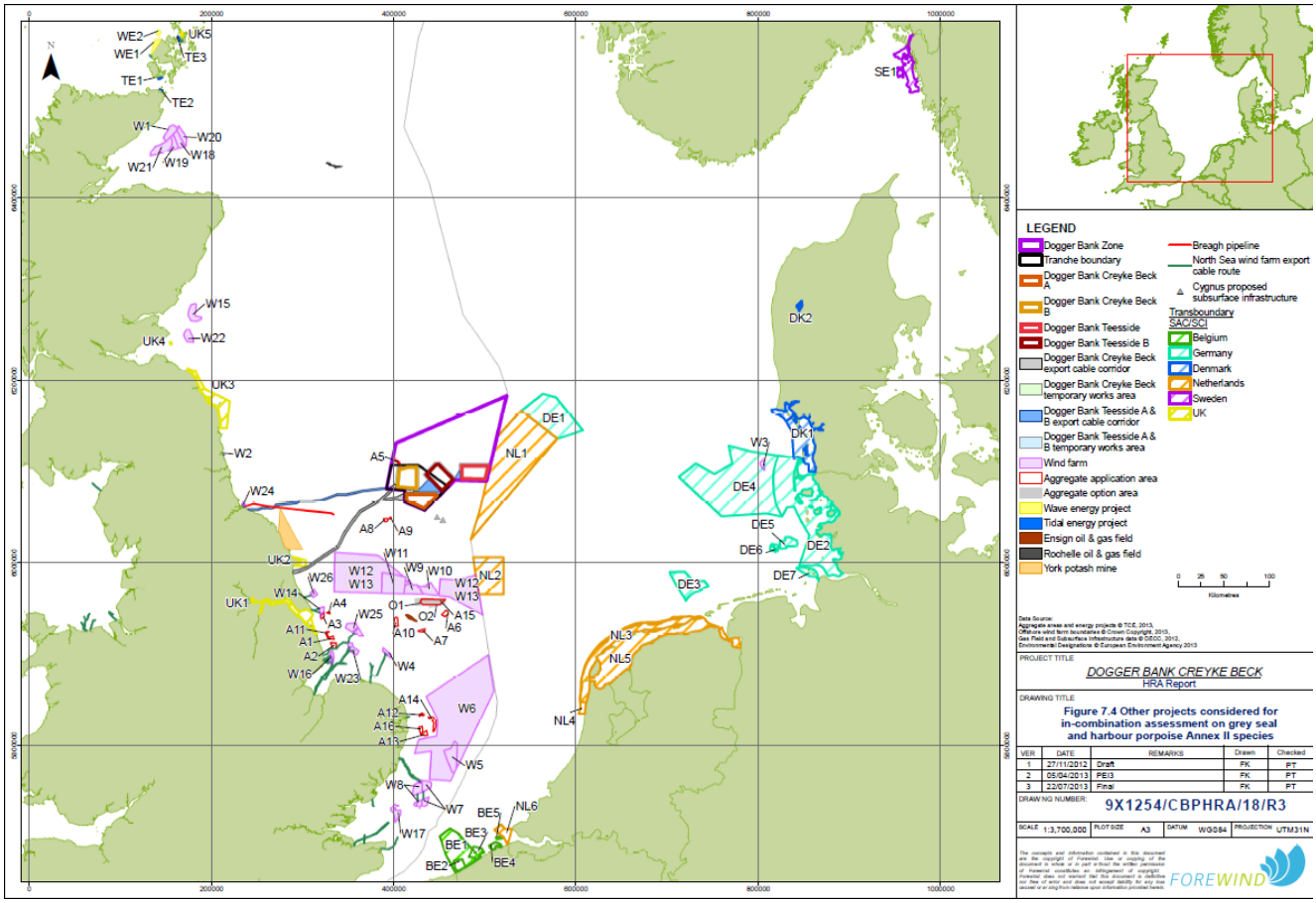


Figure 5 Other projects considered for in combination assessment on grey seal and harbour porpoise Annex II species.

12.14 respect of the in combination effect of wind farm development, where underwater noise effects associated with piling may be of significance, the work undertaken for the Project was used by the Applicant as an indicator as to the likely cumulative effect with other offshore wind farms. They found only a very small percentage of the overall grey seal population would be at risk of PTS, and taking into account the proposed mitigation measures in the DCO which would minimise any potential risk of grey seal being affected, the risk of PTS is considered negligible. It is considered that similar mitigation would be expected for marine piling for the other wind farm projects. Consequently, the Project in combination with other projects is not predicted to compromise the grey seal populations within the North Sea as a result of PTS.

12.15 Whilst the Project alone could disturb and result in displacement through avoidance of up to 1.85% of the North Sea grey seal population, as piling would be progressive and effectively represent a sequence of localised individual disturbance events, seals that may be present in the vicinity of piling would be able to relocate to adjacent areas in order to avoid potential exposure to high underwater noise levels. Similarly, there is a significant distance between piling that would take place at the Project location and other projects (including Dogger Bank Teesside A & B) such that there would be no spatially cumulative disturbance effect. Given this characteristic of the in combination displacement, together with the extent of available alternative foraging area, and the low sensitivity of grey seals to underwater noise, the Project in combination with other

projects is not predicted to compromise the grey seal populations within the North Sea as a result of TTS, and any disturbance and displacement would be short-term and temporary.

12.16 Noise generated by vessel traffic for construction and operation of the Project in combination with other projects is difficult to quantify due to the wide range of project types and the disparate locations of the other projects around the North Sea. Furthermore, projects closer to shore occur in areas in which there are high numbers of vessels and in areas of extensive grey seal activity, as recorded by seal tagging. Given the existing high levels of vessel traffic in much of the southern North Sea it is considered that the cumulative effect of additional vessel traffic for spatially discreet projects would not significantly contribute to any increase in underwater noise levels above that of the baseline such that a measurable behavioural response in grey seals would arise. During operation of the Project the grey seal populations may also display habituation to vessel movements and would therefore already display avoidance reactions. Empirical data exists to support a conclusion of no lasting disturbance or exclusion of seals around wind farm sites during operation, notably Tougaard et al (2005) and Scheidat et al. (2011). Subsequently, no in combination effect is predicted in relation to the grey seal populations within the North Sea.

12.17 Overall, it is considered that the construction and operation of the Project in combination with other projects would not have an adverse effect on the integrity of the grey seal populations of the transboundary sites.

12.18 The Applicant concluded that there would not result in an adverse effect on the integrity of the grey seal populations of the transboundary sites screened into the assessment. The SoS is satisfied that the conditions 9 of DMLs 1 and 2 and 8 within the DMLs 3 and 4 will ensure that the Applicant follows JNCC Guidelines (JNCC, 2010) and are sufficient mitigation measures to protect any grey seals that are using the immediate area when piling works commence. **The SoS is also satisfied that the potential displacement effects of the piling works will not have an adverse effect upon site integrity given the highly mobile and wide foraging nature of grey seals and their ability to feed on a wide range of prey sources.**

Harbour porpoise

12.19 Harbour porpoises (*Phocoena phocoena*) are the most abundant cetacean in the UK waters, and the North Sea is considered to be a geographically important area for the species (Reid *et al*, 2003). In the North Sea, the harbour porpoise population is estimated as 247,631 individuals (Hammond *et al*, 2013). Harbour porpoises forage over very large areas (up to 11,289 km^2; Johnstone *et al*, 2005), feeding on a wide range of fish species, typically small shoaling species from demersal or pelagic habitats such as whiting and sand eels (Santos and Pierce, 2003; Santos *et al*, 2006).

12.20 The Applicant's Screening Stage identified 23 European sites supporting this Annex II species where a potential LSE could arise as a result of the construction, operation or decommissioning of the Project. These include sites in the Belgian, Danish, Dutch, German, and Swedish territorial sectors of the North Sea. Harbour porpoise are considered to be at risk because of the potential

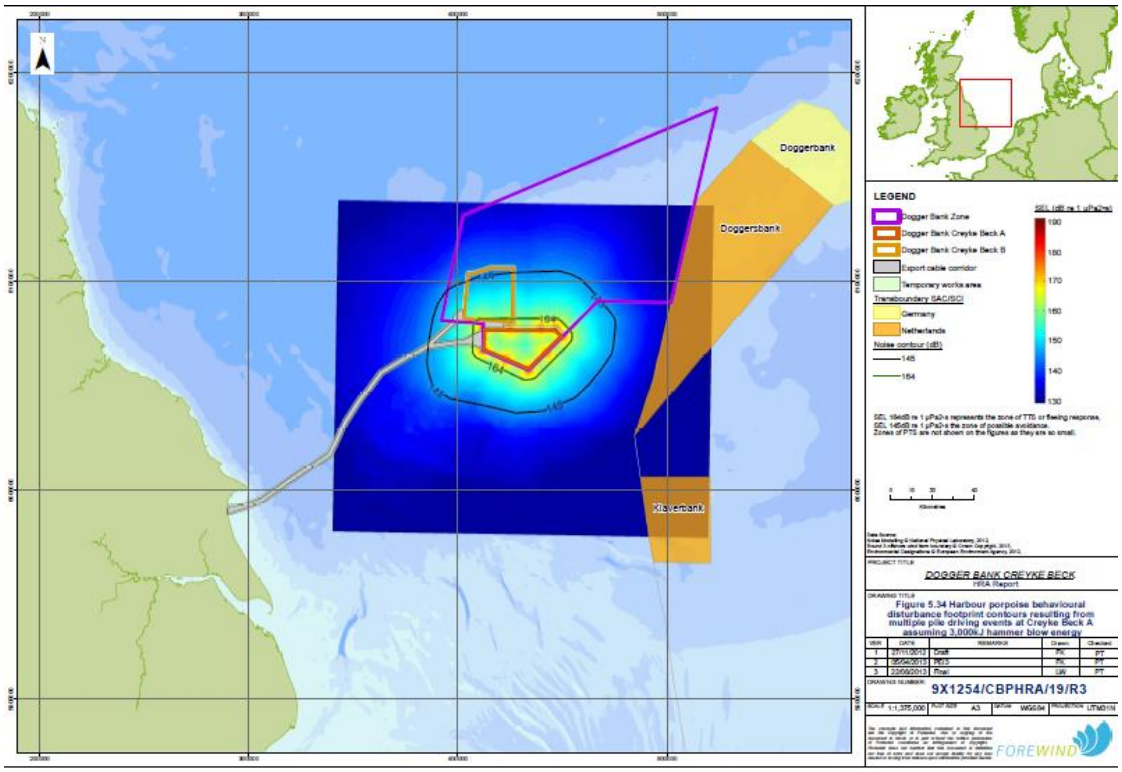
for the Project to cause physical injury, disturbance, displacement, behavioural changes, and changes in their prey availability during construction.

12.21 The Applicant (IfAA) considered that the risk of causing injury to harbour porpoises was very low because it would require an animal to be in close proximity (<700 m for 3000 kJ hammer energy) to the pile driving. The Applicant also proposed a number of mitigation measures which follow JNCC (2010) guideline to avoid harm to porpoise from piling to further reduce the risk. The mitigation measures, secured as conditions 9(e) of DMLs 1 and 2 and 8(e) within the DMLs 3 and 4 include using trained marine mammal observers to establish that there are no marine mammals within the immediate area. The conditions also require the use of soft-start approach when commencing piling activity. This involves slowly ramping up the pile driving energy to give any unseen marine mammals the opportunity to leave the area before injury occurs at maximum piling energy. The exact approach will be set out in the marine mammal mitigation protocol to be agreed with the MMO and the statutory nature conservation body; this is required within the DMLs. NE in their written response to deadline V highlights that due to the use of a Rochdale envelope the eventual project design may alter and therefore this allows them to, ensure a minimum level of mitigation but, agree the detail in the protocol at a later date.

12.22 The Applicant also estimated the potential impact of piling works to cause the displacement of harbour porpoises. The potential for piling works to displace harbour porpoises may occur, as whilst the works may not be loud enough to cause injury or death, they might still be loud enough to invoke a behavioural response form harbour porpoises such that they leave and subsequently actively avoid an area. The Applicant estimated that the spatial worst case scenario was that possible avoidance could cover a total distance of 43km (worst case 11,495km^2) around the piling works. The Applicant's view was that whilst this is a very large area, it should be viewed in the context of the wider North Sea and the foraging ranges for harbour porpoises. *Figure 6* shows the impact footprint from Creyke Beck A at maximum 3,000kJ hammer blow energy*.*

12.23 The Applicant has undertaken calculations to estimate the number of harbour porpoises which might be displaced by the piling activity in the North Sea. Those results estimate a worst case displacement (including likely and possible avoidance) scenario of approximately 7513 harbour porpoises affected. This is the equivalent of approximately 3.23 % of the North Sea population (table 5.16 IfAA). This displacement impact assumes a 100% response from individuals in the likely avoidance area.

Figure 6 Harbour porpoise behavioural disturbance footprint contours resulting from multiple pile driving events at Creyke Beck A assuming 3,000kJ hammer blow energy (IfAA).



12.24 The Applicant found the key potential impact during construction is TTS (fleeing response and avoidance) arising from underwater noise from piling and, to a significantly lesser extent, vessel movements. The Applicant felt that there would be no adverse effect on porpoises given their range, that they would return once piling ceases, the wide extent of alternative available habitats and prey species and that harbour porpoises would avoid the disturbed areas during construction. The Applicant also made a comparison with mortality arising from fisheries by-catch for which it is calculated that a mortality rate exceeding 42% of displaced individuals would need to be achieved in order for a significant impact at the population level to arise. This level of mortality is not predicted in the IfAA report.

12.25 Given the lower numbers of vessels predicted to be present or travelling to and from the Project during operation, the Applicant predicts a negligible risk of collision impact. Consequently, no measurable impact on mortality and subsequent impact on the North Sea harbour porpoise population from collision is predicted.

12.26 For the operational phase of the Project, disturbance effects (e.g. from underwater noise levels) that could give rise to significant impacts on harbour porpoise populations would not be expected. Studies used by the Applicant indicate that there is no evidence of a reduction in harbour porpoise use of existing wind farms, and potentially indicate there may even be an increase in numbers within wind farms. Modelling for the Project indicates that noise from wind turbines would not be significant and would not be expected to result in an avoidance response. As such it is concluded that the operation phase for the Project would not have an adverse effect on the integrity of the transboundary European sites or affect the achievement of favourable condition

with respect to the conservation objectives related to the harbour porpoise feature of the transboundary European sites (SCIs and pSCIs).

12.27 The Applicant concluded that from their assessment only an extremely small percentage of the harbour porpoise population for the North Sea would be affected during the project construction and operation. Consequently, the achievement of favourable condition with respect to the conservation objectives related to the harbour porpoise feature of the transboundary European sites (SAC, SCIs and pSCIs) would not be affected.

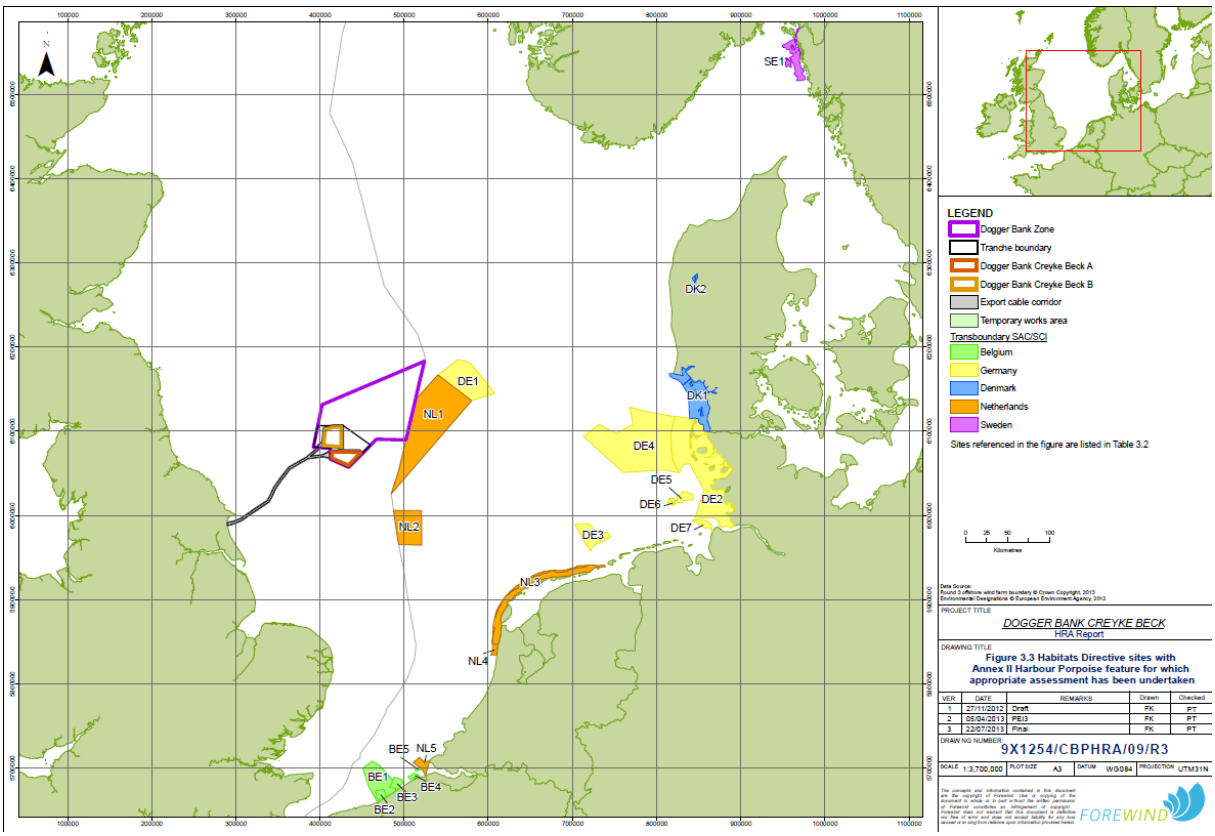


Figure 7 The Dogger Bank Zone and Harbour porpoise sites for which the Applicant found a potential LSE.

In combination

12.28 The Applicant's IfAA report shows that only an extremely small percentage of the harbour porpoise population for the North Sea would be affected as a result of Project alone. No measurable effects on the harbour porpoise population are expected to arise from alteration of prey species abundance. Disturbance to prey species is not predicted to extend to areas outside of the area that harbour porpoise are predicted to avoid due to piling for the duration of construction. Furthermore, collision risk is considered to be low due to the likelihood that harbour porpoise can detect and avoid vessels. Consequently, no in combination effect is predicted.

12.29 The key potential impact identified by the Applicant during construction is PTS and TTS (fleeing response and avoidance) arising from underwater noise from piling and to a significantly lesser extent vessel movements. Table 7.8 of the IfAA report lists the projects considered in combination with this Project. It is considered that the use of soft-start would prevent potential mortality arising

to harbour porpoise either directly or indirectly from PTS. Therefore, no impact is predicted on the North Sea harbour porpoise population in combination with other projects.

12.30 The total potential area of avoidance by harbour porpoise that is predicted to occur with all projects being constructed at the same time (the extreme worst case scenario) is predicted to result in potential displacement of up to 11.56% of the North Sea harbour porpoise population in the worst year (2016), with a lower impact predicted either prior to and afterwards. Given the mobility of the species, its wide range of prey species, the fact that the largest extent of areas likely to be affected by many of the wind farm projects are inshore, where high densities of harbour porpoise are rarely recorded and that mortality effects are of low probability, no measurable effect is predicted on the North Sea harbour porpoise population during the construction phase for the Project in combination with the other projects.

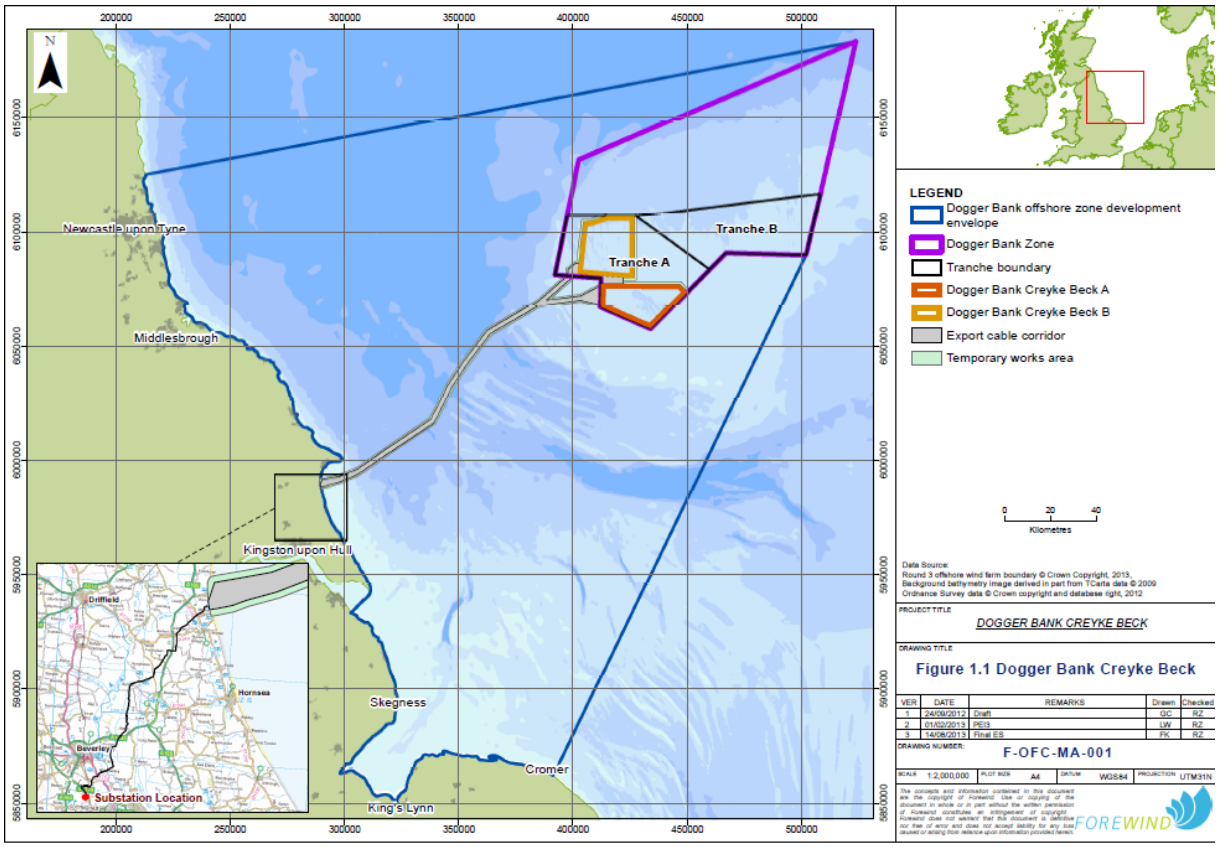
12.31 For the operational phase of wind farms, the Applicant finds no evidence to indicate that is a reduction in harbour porpoise use of existing wind farms. These studies cited in the IfAA actually indicate that potentially there may even be an increase in the use of wind farms by harbour porpoise due to a reduction in fishing activities, even taking into account the underwater noise derived from the turbines operation, maintenance vessel movements, alteration to prey species, or collision risk. It is, therefore, concluded that the operation phase for the Project in combination with the other projects would not affect the achievement of favourable condition with respect to the conservation objectives related to the harbour porpoise feature of the transboundary European sites (SCIs and pSCIs).

12.32 The Applicant considered that the construction and operation of the Project in combination with other plans and projects would not result in an adverse effect on the integrity of the harbour porpoise populations of transboundary sites. This view has not been challenged during examination. **The SoS is satisfied that there are no adverse effects from the Project construction or operation on the harbour porpoise feature of any transboundary SACs.**

Special Protected areas

12.33 Many SPAs and Ramsar sites, notably those designated for their migratory waterbird populations were screened into the assessment process by the Applicant prior to any detailed assessment work. As a consequence, a precautionary view was taken that the potential for LSEs could apply to a large number of designated SPA and Ramsar site bird populations. As the subsequent assessment work following screening demonstrated that the impact of the Project, both alone and in combination with other projects, on many designated bird populations could be considered to represent no LSEs. The screening for LSEs conclusions was not revisited as the findings for

these sites were not disputed during the examination. See



12.34 *Figure **1*** for all the SPA sites assessed as part of the HRA including transboundary sites. The Applicant concluded no LSE or adverse effect on integrity for all non-UK European sites. This finding was not challenged during examination and a similar finding was reported by the Panel's report. This transboundary assessment has therefore included a summary of these findings.

Habitat loss

12.35 The Applicant concluded that benthic habitat loss / alteration as a result of the installation and operation of wind turbines and other structures in the wind farm would not affect the overall prey resource available to foraging seabirds. No significant impact on designated seabird populations is therefore predicted.

12.36 The Applicant's IfAA report found that seabird prey resources (specifically fish) within the Project area could be temporarily affected by increased underwater noise levels during construction. However, this effect would be localised to the immediate area of piling works and temporary displacement of the resource is predicted rather than loss or decrease in availability. During operation of the wind farm, the turbine structures could act as attractants for some fish species and coupled with potential restrictions on fishing activity an overall increase in prey availability within the wind farm could occur. However, the impact of such an increase, were it to occur, on seabird populations is difficult to determine. Overall, the Applicant concluded that direct habitat loss and alteration would have no significant impact on designated seabird populations

Collision risk

12.37 For all of the SPAs examined by the Applicant, the conclusion was reached that losses that could occur as a result of collision from the project alone would not have consequences at population levels such that an adverse effect on the integrity of SPAs would arise.

12.38 The Applicant's collision risk estimates suggest that on an annual basis the potential mortality associated with the Project is likely to represent significantly less than 0.1% of the GB or GB / Ireland population of each of the 46 species that have a migration zone that overlaps with the Project area. For many species there is significant movement of migratory birds between continental sites (in the Netherlands in particular) and the UK. Many of these sites are designated SPAs (e.g. the Waddenzee). As such, the results of the analysis also apply to SPAs that form staging posts for onward migration to the UK or sites used by birds on return migration from the UK. As a result of collision losses, no adverse effect on the integrity of the screened SPAs designated for their migratory bird populations is therefore predicted.

Barrier effects

12.39 The Applicant felt that it is unlikely that the Project would act as a significant barrier to the foraging movements of breeding seabirds. For all species with SPA designated breeding colonies within foraging range of the Project, only UK SPAs were identified where greater than 1% of the breeding population at individual SPAs could potentially be affected.

12.40 The overall conclusion is that, for breeding seabirds, the Project would not exert an appreciable barrier effect, such that detrimental impacts on designated populations at individual SPAs would arise. No adverse effect on the integrity of those SPAs and their designated populations for which a barrier effect has been identified is therefore predicted.

12.41 Considering both the small percentage of migrating bird populations likely to be involved and the relative increase in flight distance that Dogger Bank Creyke Beck could exert, it is concluded that the potential barrier posed by wind farm development would be unlikely to have a detrimental impact upon the energetics of migratory birds. No adverse effect on the integrity of designated SPA migratory bird populations as a result of the potential barrier posed by the wind farm is therefore predicted.

In Combination

12.42 The Applicant also looked at in combination impacts for bird species where there was a LSE. There is more detail within the AA for UK SPAs and pSPA. The findings however were that the Project would not result in a displacement/ barrier/ habitat loss/ or collision risk impact that would constitute an adverse effect on the integrity of the screened SPAs designated for any bird populations.

Transboundary summary

13.0 The SoS has considered the potential for the Project to affect 150 transboundary European sites in Germany, Netherlands, Belgium, Denmark, Sweden, France and Norway. Those sites support harbour porpoises, grey seals, sandbanks which are slightly covered by seawater all the time and waterbirds.

13.1 The SoS has considered all of the information available, particularly noting the lack of objections or representations from any of the Member States potentially affected by the development and the recommendation made by the Panel report. None of the EEA States consulted under Regulation 24 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 took part in the examination or provided representation in reply to the ExA's written questions. The Applicant's ES and IfAA have concluded that the Project has no likely significant transboundary effects or adverse effect on the integrity on all transboundary sites. The ExA was therefore satisfied that there is no evidence other than accepting the assessment of transboundary impacts set out in the ES and Applicant's IfAA report.

13.2 **The SoS is satisfied that the Project, either alone or in combination with other plans or projects, will not adversely affect the integrity of any of the transboundary European sites. The SoS is therefore satisfied that all transboundary matters had been sufficiently addressed and that there were no matters outstanding which would prevent the DCO from being made.**

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National Infrastructure Consents Team

Department of Energy and Climate Change

Date: **17th February 2015**

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Annex A

Table 19 Showing the UK European sites identified by the Applicant and considered during the examination from the RIES.

Column 1: European Sites listed in the Applicant's HRA Report, which are located within the UK	**Column 2: European Sites for which the Applicant concluded No LSE**	**Column 3: European Sites for which the Applicant concluded LSE**	**Column 4: European Sites for which the Applicant's conclusion of No AEOI was not disputed**	**Column 5: European Sites for which the Applicant's conclusion of No AEOI was disputed**
Abberton Reservoir SPA	-	Abberton Reservoir SPA	Abberton Reservoir SPA	–
Abberton Reservoir Ramsar	-	Abberton Reservoir Ramsar	Abberton Reservoir Ramsar	–
Alde-Ore Estuary SPA	-	Alde-Ore Estuary SPA	Alde-Ore Estuary SPA	–
Alde-Ore Estuary Ramsar	-	Alde-Ore Estuary Ramsar	Alde-Ore Estuary Ramsar	–
Arun Valley SPA	-	Arun Valley SPA	Arun Valley SPA	–
Arun Valley Ramsar	-	Arun Valley Ramsar	Arun Valley Ramsar	–
Auskerry SPA	Auskerry SPA	–	–	–
Avon Valley SPA	-	Avon Valley SPA	Avon Valley SPA	–
Avon Valley Ramsar	-	Avon Valley Ramsar	Avon Valley Ramsar	–
Beast Cliff – Whitby (Robin Hood's Bay) SAC	Beast Cliff – Whitby (Robin Hood's Bay) SAC	–	–	–
Benacre to Easton Bavents SPA	-	Benacre to Easton Bavents SPA	Benacre to Easton Bavents SPA	–
Benfleet and Southend Marshes SPA	-	Benfleet and Southend Marshes SPA	Benfleet and Southend Marshes SPA	–
Benfleet and Southend Marshes Ramsar	-	Benfleet and Southend Marshes Ramsar	Benfleet and Southend Marshes Ramsar	–
Berriedale and Langwell Waters SAC	Berriedale and Langwell Waters SAC	–	–	–
Berwickshire and North Northumberland Coast SAC	-	Berwickshire and North Northumberland Coast SAC	Berwickshire and North Northumberland Coast SAC	–
Blackwater Estuary (Mid-Essex Coast Phase 4) SPA	-	Blackwater Estuary (Mid-Essex Coast Phase 4) SPA	Blackwater Estuary (Mid-Essex Coast Phase 4) SPA	–
Blackwater Estuary (Mid-Essex Coast Phase 4) Ramsar	-	Blackwater Estuary (Mid-Essex Coast Phase 4) Ramsar	Blackwater Estuary (Mid-Essex Coast Phase 4) Ramsar	–
Breydon Water SPA	-	Breydon Water SPA	Breydon Water SPA	–

Column 1: European Sites listed in the Applicant's HRA Report, which are located within the UK	**Column 2: European Sites for which the Applicant concluded No LSE**	**Column 3: European Sites for which the Applicant concluded LSE**	**Column 4: European Sites for which the Applicant's conclusion of No AEOI was not disputed**	**Column 5: European Sites for which the Applicant's conclusion of No AEOI was disputed**
Breydon Water Ramsar	-	Breydon Water Ramsar	Breydon Water Ramsar	–
Broadland SPA	-	Broadland SPA	Broadland SPA	–
Broadland Ramsar	-	Broadland Ramsar	Broadland Ramsar	–
Buchan Ness to Collieston Coast SPA	-	Buchan Ness to Collieston Coast SPA	Buchan Ness to Collieston Coast SPA	–
Caithness and Sutherland Peatlands SPA	Caithness and Sutherland Peatlands SPA	–	–	–
Caithness and Sutherland Peatlands Ramsar	Caithness and Sutherland Peatlands Ramsar	–	–	–
Caithness Lochs SPA	Caithness Lochs SPA	–	–	–
Caithness Lochs Ramsar	Caithness Lochs Ramsar	–	–	–
Calf of Eday SPA	–	Calf of Eday SPA	Calf of Eday SPA	–
Cape of Wrath SPA	–	Cape of Wrath SPA	Cape of Wrath SPA	–
Chesil Beach and the Fleet SPA	Chesil Beach and the Fleet SPA	–	–	–
Chesil Beach and the Fleet Ramsar	Chesil Beach and the Fleet Ramsar	–	–	–
Chichester and Langstone Harbours SPA	–	Chichester and Langstone Harbours SPA	Chichester and Langstone Harbours SPA	–
Chichester and Langstone Harbours Ramsar	–	Chichester and Langstone Harbours Ramsar	Chichester and Langstone Harbours Ramsar	–
Colne Estuary (Mid-Essex Coast Phase 2) SPA	–	Colne Estuary (Mid-Essex Coast Phase 2) SPA	Colne Estuary (Mid-Essex Coast Phase 2) SPA	–
Colne Estuary (Mid-Essex Coast Phase 2) Ramsar	–	Colne Estuary (Mid-Essex Coast Phase 2) Ramsar	Colne Estuary (Mid-Essex Coast Phase 2) Ramsar	–

Column 1: European Sites listed in the Applicant's HRA Report, which are located within the UK	**Column 2: European Sites for which the Applicant concluded No LSE**	**Column 3: European Sites for which the Applicant concluded LSE**	**Column 4: European Sites for which the Applicant's conclusion of No AEOI was not disputed**	**Column 5: European Sites for which the Applicant's conclusion of No AEOI was disputed**
Copinsay SPA	–	Copinsay SPA	Copinsay SPA	–
Coquet Island SPA	–	Coquet Island SPA	Coquet Island SPA	–
Cromarty Firth SPA	–	Cromarty Firth SPA	Cromarty Firth SPA	–
Cromarty Firth Ramsar	–	Cromarty Firth Ramsar	Cromarty Firth Ramsar	–
Crouch and Roach Estuaries (Mid-Essex Coast Phase 3) SPA	Crouch and Roach Estuaries (Mid-Essex Coast Phase 3) SPA	–	–	–
Crouch and Roach Estuaries (Mid-Essex Coast Phase 3) Ramsar	–	Crouch and Roach Estuaries (Mid-Essex Coast Phase 3) Ramsar	Crouch and Roach Estuaries (Mid-Essex Coast Phase 3) Ramsar	–
Deben Estuary SPA	Deben Estuary SPA	–	–	–
Deben Estuary Ramsar	Deben Estuary Ramsar	–	–	–
Dengie (Mid-Essex Coast Phase 1) SPA	–	Dengie (Mid-Essex Coast Phase 1) SPA	Dengie (Mid-Essex Coast Phase 1) SPA	–
Dengie (Mid-Essex Coast Phase 1) Ramsar	–	Dengie (Mid-Essex Coast Phase 1) Ramsar	Dengie (Mid-Essex Coast Phase 1) Ramsar	–
Dogger Bank cSAC/SCI	–	Dogger Bank cSAC/SCI	–	Dogger Bank cSAC/SCI The Applicant concluded LSE for the one feature of this site (see Table 1)
Dornoch Firth and Lock Fleet SPA	–	Dornoch Firth and Lock Fleet SPA	Dornoch Firth and Lock Fleet SPA	–
Dornoch Firth and Lock Fleet Ramsar	–	Dornoch Firth and Lock Fleet Ramsar	Dornoch Firth and Lock Fleet Ramsar	–
Dorset Heathlands SPA	–	Dorset Heathlands SPA	Dorset Heathlands SPA	–
Dorset Heathlands Ramsar	Dorset Heathlands Ramsar	–	–	–
Duddon Estuary SPA	–	Duddon Estuary SPA	Duddon Estuary SPA	–
Duddon Estuary Ramsar	–	Duddon Estuary Ramsar	Duddon Estuary Ramsar	–
Dungeness to Pett Level SPA	–	Dungeness to Pett Level SPA	Dungeness to Pett Level SPA	–

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Dungeness to Pett Level Ramsar	–	Dungeness to Pett Level Ramsar	Dungeness to Pett Level Ramsar	–
East Caithness Cliffs SPA	–	East Caithness Cliffs SPA	East Caithness Cliffs SPA	–
East Sanday Coast SPA	–	East Sanday Coast SPA	East Sanday Coast SPA	–
East Sanday Coast Ramsar	–	East Sanday Coast Ramsar	East Sanday Coast Ramsar	–
Exe Estuary SPA	–	Exe Estuary SPA	Exe Estuary SPA	–
Exe Estuary Ramsar	–	Exe Estuary Ramsar	Exe Estuary Ramsar	–
Fair Isle SPA	–	Fair Isle SPA	Fair Isle SPA	–
Faray and Holm of Faray SAC	–	Faray and Holm of Faray SAC	Faray and Holm of Faray SAC	–
Farne Islands SPA	–	Farne Islands SPA	–	Farne Islands SPA See RIES for features for which no LSE was concluded by the applicant and Table 1 for features for which LSE was concluded by the applicant.
Fetlar SPA	–	Fetlar SPA	Fetlar SPA	–
Firth of Forth SPA	–	Firth of Forth SPA	Firth of Forth SPA	–
Firth of Forth Ramsar	–	Firth of Forth Ramsar	Firth of Forth Ramsar	–
Firth of Tay and Eden Estuary SPA	–	Firth of Tay and Eden Estuary SPA	Firth of Tay and Eden Estuary SPA	–
Firth of Tay and Eden Estuary SPA	–	Firth of Tay and Eden Estuary SPA	Firth of Tay and Eden Estuary SPA	–
Flamborough Head SAC	–	Flamborough Head SAC	Flamborough Head SAC	–
Flamborough Head and Bempton Cliffs SPA	–	Flamborough Head and Bempton Cliffs SPA	–	Flamborough Head and Bempton Cliffs SPA See RIES for features for which no LSE was concluded by the applicant and Table 1 for features for which LSE was concluded by the applicant.

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(Flamborough and Filey Coast pSPA)[10]	–	Flamborough and Filey Coast pSPA	–	Flamborough and Filey Coast pSPA See RIES for features for which no LSE was concluded by the applicant and Table 1 for features for which LSE was concluded by the applicant.
Forth Islands SPA	–	Forth Islands SPA	–	Forth Islands SPA See RIES for features for which no LSE was concluded by the applicant and Table 1 for features for which LSE was concluded by the applicant
Foula SPA	–	Foula SPA	Foula SPA	–
Foulness (Mid-Essex Coast Phase 5) SPA	–	Foulness (Mid-Essex Coast Phase 5) SPA	Foulness (Mid-Essex Coast Phase 5) SPA	–
Foulness (Mid-Essex Coast Phase 5) Ramsar	–	Foulness (Mid-Essex Coast Phase 5) Ramsar	Foulness (Mid-Essex Coast Phase 5) Ramsar	–

10 The Applicant's HRA screened and assessed the potential effects of the Project on Flamborough Head and Bempton Cliffs SPA (Appendix C of the Applicant's HRA Report (final LSE screening for all European sites). However, NE and JNCC in their joint relevant representations identified Flamborough and Filey Coast pSPA as one of the SPA sites for which NE/JNCC have outstanding concerns, paragraph 2.2.1. In response to Question 43 of the ExA's first round questions, NE explained that the Flamborough and Filey Coast pSPA, supersedes the Flamborough Head and Bempton Cliffs SPA, and was at the time that NE responded to the ExA's first round questions, under consultation for breeding gannets, kittiwakes, guillemots and razorbills, as well as seabird assemblage (Annex G, response to question 43). NE subsequently confirmed in its written summary of its oral case during the first HRA ISH on 4 April 2014 that pSPAs are to be dealt with in exactly the same manner as SPAs and therefore NE did not feel it was necessary to consider both sites separately and hence NE only gave consideration to the pSPA (paragraph 7). However, NE also stated that as and when the SPA and pSPA sites become one they would be treated as one site, but currently for the purpose of legal assessment they are two sites and therefore need to be treated separately (paragraph 7). The RSPB also identified the need to bear in mind the distinction between the Flamborough Head and Bempton Cliffs SPA, which is designated, and the Flamborough and Filey Coast pSPA (paragraph 2.7). The Applicant provided separate screening and integrity matrices for the Flamborough Head and Bempton Cliffs SPA and the Flamborough and Filey Coast pSPA on 19 May 2014.

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Fowlsheugh SPA	–	Fowlsheugh SPA	Fowlsheugh SPA	–
Gibraltar Point SPA	–	Gibraltar Point SPA	Gibraltar Point SPA	–
Gibraltar Point Ramsar	–	Gibraltar Point Ramsar	Gibraltar Point Ramsar	–
Great Yarmouth North Denes SPA	Great Yarmouth North Denes SPA	–	–	–
Haisborough, Hammond and Winterton cSAC	Haisborough, Hammond and Winterton cSAC	–	–	–
Hamford Water SPA	–	Hamford Water SPA	Hamford Water SPA	–
Hamford Water Ramsar	–	Hamford Water Ramsar	Hamford Water Ramsar	–
Hermaness, Saxa Vord and Valla Field SPA	–	Hermaness, Saxa Vord and Valla Field SPA	Hermaness, Saxa Vord and Valla Field SPA	–
Holburn Lake and Moss SPA	Holburn Lake and Moss SPA	–	–	–
Holburn Lake and Moss Ramsar	–	Holburn Lake and Moss Ramsar	Holburn Lake and Moss Ramsar	–
Hornsea Mere SPA	–	Hornsea Mere SPA	Hornsea Mere SPA	–
Hoy SPA	–	Hoy SPA	Hoy SPA	–
Humber Estuary SAC	–	Humber Estuary SAC	Humber Estuary SAC	–
Humber Estuary Ramsar	–	Humber Estuary Ramsar	Humber Estuary Ramsar	–
Humber Flats, Marshes and Coast SPA	–	Humber Flats, Marshes and Coast SPA	Humber Flats, Marshes and Coast SPA	–
Inner Dowsing, Race Bank and North Ridge cSAC	Inner Dowsing, Race Bank and North Ridge cSAC	–	–	–
Inner Moray Firth SPA	–	Inner Moray Firth SPA	Inner Moray Firth SPA	–
Inner Moray Firth Ramsar	–	Inner Moray Firth Ramsar	Inner Moray Firth Ramsar	–
Isle of May SAC	–	Isle of May SAC	Isle of May SAC	–
Lee Valley SPA	–	Lee Valley SPA	Lee Valley SPA	–
Lee Valley Ramsar	–	Lee Valley Ramsar	Lee Valley Ramsar	–
Leighton Moss SPA	–	Leighton Moss SPA	Leighton Moss SPA	–
Leighton Moss Ramsar	–	Leighton Moss Ramsar	Leighton Moss Ramsar	–
Lindisfarne SPA	–	Lindisfarne SPA	Lindisfarne SPA	–
Lindisfarne Ramsar	–	Lindisfarne Ramsar	Lindisfarne Ramsar	–
Loch of Strathbeg SPA	–	Loch of Strathbeg SPA	Loch of Strathbeg SPA	–
Loch of Strathbeg Ramsar	–	Loch of Strathbeg Ramsar	Loch of Strathbeg Ramsar	–

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Lower Derwent Valley SPA	–	Lower Derwent Valley SPA	Lower Derwent Valley SPA	–
Lower Derwent Valley Ramsar	–	Lower Derwent Valley Ramsar	Lower Derwent Valley Ramsar	–
Marazion Marsh SPA	–	Marazion Marsh SPA	Marazion Marsh SPA	–
Martin Mere SPA	–	Martin Mere SPA	Martin Mere SPA	–
Martin Mere Ramsar	–	Martin Mere Ramsar	Martin Mere Ramsar	–
Marwick Head SPA	–	Marwick Head SPA	Marwick Head SPA	–
Medway Estuary and Marshes SPA	–	Medway Estuary and Marshes SPA	Medway Estuary and Marshes SPA	–
Medway Estuary and Marshes Ramsar	–	Medway Estuary and Marshes Ramsar	Medway Estuary and Marshes Ramsar	–
Mersey Estuary SPA	–	Mersey Estuary SPA	Mersey Estuary SPA	–
Mersey Estuary Ramsar	–	Mersey Estuary Ramsar	Mersey Estuary Ramsar	–
Mersey Narrows and North Wirral Foreshore pSPA	–	Mersey Narrows and North Wirral Foreshore pSPA	Mersey Narrows and North Wirral Foreshore pSPA	–
Mersey Narrows and North Wirral Foreshore pRamsar	–	Mersey Narrows and North Wirral Foreshore pRamsar	Mersey Narrows and North Wirral Foreshore pRamsar	–
Minsmere-Walberswick SPA	–	Minsmere-Walberswick SPA	Minsmere-Walberswick SPA	–
Minsmere-Walberswick Ramsar	–	Minsmere-Walberswick Ramsar	Minsmere-Walberswick Ramsar	–
Montrose Basin SPA	–	Montrose Basin SPA	Montrose Basin SPA	–
Montrose Basin Ramsar	–	Montrose Basin Ramsar	Montrose Basin Ramsar	–
Moray and Nairn Coast SPA	–	Moray and Nairn Coast SPA	Moray and Nairn Coast SPA	–
Moray and Nairn Coast Ramsar	–	Moray and Nairn Coast Ramsar	Moray and Nairn Coast Ramsar	–
Morecambe Bay SPA	–	Morecambe Bay SPA	Morecambe Bay SPA	–
Morecambe Bay Ramsar	–	Morecambe Bay Ramsar	Morecambe Bay Ramsar	–
Mousa SPA	Mousa SPA	–	–	–
Nene Washes SPA	–	Nene Washes SPA	Nene Washes SPA	–
Nene Washes Ramsar	–	Nene Washes Ramsar	Nene Washes Ramsar	–
New Forest SPA	–	New Forest SPA	New Forest SPA	–
North Caithness Cliffs SPA	–	North Caithness Cliffs SPA	North Caithness Cliffs SPA	–
North Norfolk Coast SAC	North Norfolk Coast SAC	–	–	–
North Norfolk Coast SPA	–	North Norfolk Coast SPA	North Norfolk Coast SPA	–
North Norfolk Coast Ramsar	–	North Norfolk Coast Ramsar	North Norfolk Coast Ramsar	–

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North Norfolk Sandbanks and Saturn Reef cSAC	North Norfolk Sandbanks and Saturn Reef cSAC	–	–	–
Northumbria Coast SPA	–	Northumbria Coast SPA	Northumbria Coast SPA	–
Northumbria Coast Ramsar	–	Northumbria Coast Ramsar	Northumbria Coast Ramsar	–
Noss SPA	–	Noss SPA	Noss SPA	–
Orkney Mainland Moors SPA[11]	–	Orkney Mainland Moors SPA	Orkney Mainland Moors SPA	–
Otterswick and Graveland SPA	Otterswick and Graveland SPA	–	–	–
Ouse Washes SPA	–	Ouse Washes SPA	Ouse Washes SPA	–
Ouse Washes Ramsar	–	Ouse Washes Ramsar	Ouse Washes Ramsar	–
Outer Thames Estuary	Outer Thames Estuary	–	–	–
Pagham Harbour SPA	–	Pagham Harbour SPA	Pagham Harbour SPA	–
Pagham Harbour Ramsar	–	Pagham Harbour Ramsar	Pagham Harbour Ramsar	–
Papa Stour SPA	Papa Stour SPA	–	–	–
Papa Westray (North Hill and Holm SPA)	–	Papa Westray (North Hill and Holm SPA)	Papa Westray (North Hill and Holm SPA)	–
Pentland Firth Islands SPA	Pentland Firth Islands SPA	–	–	–
Poole Harbour SPA	–	Poole Harbour SPA	Poole Harbour SPA	–
Poole Harbour Ramsar	–	Poole Harbour Ramsar	Poole Harbour Ramsar	–
Ramna Stacks and Gruney SPA	Ramna Stacks and	–	–	–

11 In the HRA ISH on 1 July 2014, the ExA noted an apparent inconsistency between Appendix C of the Applicant's IfAA Report (final LSE screening for all European sites) and the screening matrices regarding short eared owl and hen harrier features of Orkney Mainland Moors SPA. Appendix C of the Applicant's HRA Report identified the following features for this site: hen harrier, short eared owl and red throated diver (breeding); and short eared own (wintering). Appendix C records no LSE for these features of this site. However, the Applicant's screening matrix for this site lists at the features: hen harrier, short eared owl and red throated diver (breeding); and hen harrier (wintering). The screening matrix concludes LSE for wintering hen harrier. The Applicant later confirmed that short-eared owl (wintering) was a typo in the screening report and that the screening matrices are correct (Applicant's Deadline VI – Written Summary of HRA Hearing Oral Case, paragraph 5.2. The correct features for this European site have been included within the Applicant's updated screening and integrity matrices submitted at Deadline VI (Deadline VI Appendix 10 – Updated HRA Integrity Matrices and Deadline VI Appendix 11 – Updated HRA Screening Matrices.

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Gruney SPA				
Ribble and Alt Estuaries SPA	–	Ribble and Alt Estuaries SPA	Ribble and Alt Estuaries SPA	–
Ribble and Alt Estuaries Ramsar	–	Ribble and Alt Estuaries Ramsar	Ribble and Alt Estuaries Ramsar	–
River Derwent SAC	River Derwent SAC	–	–	–
River Oykel SAC	River Oykel SAC	–	–	–
River South Esk SAC	River South Esk SAC	–	–	–
River Spey SAC	River Spey SAC	–	–	–
River Tay SAC	River Tay SAC	–	–	–
River Teith SAC	River Teith SAC	–	–	–
River Thurso SAC	River Thurso SAC	–	–	–
River Tweed SAC	River Tweed SAC	–	–	–
Ronas Hill – North Roe and Tingon SPA	Ronas Hill – North Roe and Tingon SPA	–	–	–
Ronas Hill – North Roe and Tingon Ramsar	Ronas Hill – North Roe and Tingon Ramsar	–	–	–
Rousay SPA	–	Rousay SPA	Rousay SPA	–
Rutland Water SPA	–	Rutland Water SPA	Rutland Water SPA	–
Rutland Water Ramsar	–	Rutland Water Ramsar	Rutland Water Ramsar	–
Sailsbury Plain SPA	–	Sailsbury Plain SPA	Sailsbury Plain SPA	–
Saltfleetby-Theddlethorpe Dunes and Gibraltar Point SAC	Saltfleetby-Theddlethorpe Dunes and Gibraltar Point SAC	–	–	–
Severn Estuary SPA	–	Severn Estuary SPA	Severn Estuary SPA	–
Severn Estuary Ramsar	–	Severn Estuary Ramsar	Severn Estuary Ramsar	–
Solent and Southampton Water SPA	–	Solent and Southampton Water SPA	Solent and Southampton Water SPA	–
Solent and Southampton Water Ramsar	–	Solent and Southampton Water Ramsar	Solent and Southampton Water Ramsar	–
Somerset Levels and Moors	–	Somerset Levels and	Somerset Levels and Moors	–

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SPA	Moors SPA		SPA	
Somerset Levels and Moors Ramsar	–	Somerset Levels and Moors Ramsar	Somerset Levels and Moors Ramsar	–
South West London Waterbodies SPA	–	South West London Waterbodies SPA	South West London Waterbodies SPA	–
South West London Waterbodies Ramsar	–	South West London Waterbodies Ramsar	South West London Waterbodies Ramsar	–
St Abb's Head to Fast Castle SPA	–	St Abb's Head to Fast Castle SPA	St Abb's Head to Fast Castle SPA	–
Stodmarsh SPA	–	Stodmarsh SPA	Stodmarsh SPA	–
Stodmarsh Ramsar	–	Stodmarsh Ramsar	Stodmarsh Ramsar	–
Stour and Orwall Estuaries SPA	–	Stour and Orwall Estuaries SPA	Stour and Orwall Estuaries SPA	–
Stour and Orwall Estuaries Ramsar	–	Stour and Orwall Estuaries Ramsar	Stour and Orwall Estuaries Ramsar	–
Sule Skerry and Sule Stack SPA	–	Sule Skerry and Sule Stack SPA	Sule Skerry and Sule Stack SPA	–
Sumburgh Head SPA	–	Sumburgh Head SPA	Sumburgh Head SPA	–
Switha SPA	Switha SPA	–	–	–
Teesmouth and Cleveland Coast SPA	–	Teesmouth and Cleveland Coast SPA	Teesmouth and Cleveland Coast SPA	–
Teesmouth and Cleveland Coast Ramsar	–	Teesmouth and Cleveland Coast Ramsar	Teesmouth and Cleveland Coast Ramsar	–
Thames Estuary and Marshes SPA	–	Thames Estuary and Marshes SPA	Thames Estuary and Marshes SPA	–
Thames Estuary and Marshes Ramsar	–	Thames Estuary and Marshes Ramsar	Thames Estuary and Marshes Ramsar	–
Thanet Coast and Sandwich Bay SPA	–	Thanet Coast and Sandwich Bay SPA	Thanet Coast and Sandwich Bay SPA	–
Thanet Coast and Sandwich Bay Ramsar	–	Thanet Coast and Sandwich Bay Ramsar	Thanet Coast and Sandwich Bay Ramsar	–

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The Dee Estuary SPA	–	The Dee Estuary SPA	The Dee Estuary SPA	–
The Dee Estuary Ramsar	–	The Dee Estuary Ramsar	The Dee Estuary Ramsar	–
The River Dee SAC	The River Dee SAC	–	–	–
The Swale SPA	–	The Swale SPA	The Swale SPA	–
The Swale Ramsar	–	The Swale Ramsar	The Swale Ramsar	–
The Wash SPA	–	The Wash SPA	The Wash SPA	–
The Wash Ramsar	–	The Wash Ramsar	The Wash Ramsar	–
The Wash and North Norfolk Coast SAC	The Wash and North Norfolk Coast SAC	–	–	–
Troup, Pennan and Lion's Head SPA	–	Troup, Pennan and Lion's Head SPA	Troup, Pennan and Lion's Head SPA	–
Tweed Estuary SAC	Tweed Estuary SAC	–	–	–
Upper Solway Flats and Marshes SPA	–	Upper Solway Flats and Marshes SPA	Upper Solway Flats and Marshes SPA	–
Upper Solway Flats and Marshes Ramsar	–	Upper Solway Flats and Marshes Ramsar	Upper Solway Flats and Marshes Ramsar	–
West Westray SPA	–	West Westray SPA	West Westray SPA	–
Ythan Estuary, Sands of Forvie and Meikle Loch SPA	–	Ythan Estuary, Sands of Forvie and Meikle Loch SPA	Ythan Estuary, Sands of Forvie and Meikle Loch SPA	–
Ythan Estuary and Meikle Loch Ramsar	–	Ythan Estuary and Meikle Loch Ramsar	Ythan Estuary and Meikle Loch Ramsar	–