



Department for  
Business, Energy  
& Industrial Strategy

# EAST ANGLIA ONE NORTH HABITATS REGULATIONS ASSESSMENT

Regulation 63 of the Conservation of Habitats and Species  
Regulations 2017, and

Regulation 28 of the Conservation of Offshore Marine  
Habitats and Species Regulations 2017



March 2022



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## 1. Introduction

### 1.1. Background

This is a record of the Habitats Regulations Assessment (HRA) that the Secretary of State for Business, Energy and Industrial Strategy has undertaken under the Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (“the Offshore Habitats Regulations”) in respect of the Development Consent Order (DCO) and Deemed Marine Licences (dMLs) for East Anglia One North and its associated infrastructure (the Project). For the purposes of these Regulations the Secretary of State is the competent authority (under the Habitats Regulations and the Offshore Habitats Regulations).

The Project comprises the construction and operation of up to 67 wind turbine generators (WTGs) with a maximum tip height of up to 282 metres, together with up to four offshore electrical platforms, an offshore construction, operation and maintenance platform, a meteorological mast, inert-array cables linking the WTGs to each other and to the offshore electrical platforms, platform link cables and up to two export cables to take the electricity generated by the WTGs from the offshore electrical platforms to landfall.

The onshore works include landfall connection works north of Thorpeness in Suffolk, underground cables running from landfall to a new onshore substation located at Grove Wood, Friston, Suffolk together with a new National Grid substation and National Grid overhead line realignment works including the reconstruction and/or relocation of up to three pylons, construction of up to one additional pylon and the construction of up to three permanent sealing end compounds.

The Application was submitted under section 37 of the Planning Act 2008 (PA2008) and was received in full by the Planning Inspectorate (PINS) on 22 November 2019.

Following receipt of the ExA’s report, the Secretary of State requested further information relevant to this HRA on 2<sup>nd</sup> November<sup>1</sup> and 20<sup>th</sup> December 2021<sup>2</sup>.

The Secretary of State’s conclusions contained in this report have been informed by the ExA’s Report, and further information and analysis provided by the Applicant in response to requests made by the Secretary of State for further information. This includes updates to the collision risk models, displacement models and population viability assessments to account for uncertainties in the parameter of in-combination projects as well as further details of measures to compensate for impacts on The Outer Thames Estuary SPA.

The report also considers the potential effects of the Project on designated sites in other European Economic Area States (transboundary sites). This is included under the transboundary assessment section of the report (Section 0).

### 1.2. Habitats Regulations Assessment (HRA)

In the UK, the Habitats Regulations apply as far as the 12 nautical miles (nm) limit of territorial waters. Beyond territorial waters, the Offshore Habitats Regulations serve the same function for the UK’s offshore marine area. Following the UK’s departure from the European Union, these domestic regulations continue

<sup>1</sup> BEIS (2021). *Letter Reference EN010077*. Dated 2 November 2021.

<sup>2</sup> BEIS (2021). *Letter Reference EN010077*. Dated 20 December 2021.

to apply. The Secretary of State notes the Application covers areas within and outside the 12nm limit, so both sets of Regulations apply and hereafter will be referred to collectively as 'the Habitats Regulations'.

The Habitats Regulations provide for the designation of sites for the protection of habitats and species of international importance. These sites are called Special Areas of Conservation (SACs). The Regulations also provide for the classification of sites for the protection of rare and vulnerable birds and for regularly occurring migratory species within the UK and internationally. These sites are called Special Protection Areas (SPAs). SACs and SPAs together, referred to as European sites in legislation, form part of the UK's national site network.

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. Government policy is to afford Ramsar sites in the United Kingdom the same protection as sites within the national site network (collectively referred to in this HRA as protected sites).

Regulation 63 of the Conservation of Habitats and Species Regulations 2017 provides that:

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

And that: *In the light of the conclusions of the assessment, and subject to regulation 64 [IROPI], the competent authority may agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site or the European offshore marine site (as the case may be).*

Regulation 28 of the Conservation of Offshore Marine Habitats and Species Regulations 2017 contains similar provisions:

*Before deciding to undertake, or give any consent, permission or other authorisation for, a relevant plan or project, a competent authority must make an appropriate assessment of the implications of the plan or project for the site in view of that site's conservation objectives.*

And that:

*In the light of the conclusions of the assessment, and subject to regulation 29 [IROPI], the competent authority may agree to the plan or project only if it has ascertained that it will not adversely affect the integrity of the European offshore marine site or European site (as the case may be).*

This Application is not directly connected with, or necessary to, the management of a protected site. The Habitats Regulations require the Secretary of State to consider whether the project is likely to have a significant effect (LSE) on any such site, alone or in-combination with other plans and projects. Where the potential for LSE cannot be excluded, an appropriate assessment (AA) of the implications of the project for that site in view of its conservation objectives must be completed. Therefore, the Secretary of State must determine whether the project will have an adverse effect on the integrity of the site(s). In this document, the first stage assessment of LSEs and, where required, the second stage assessment (the AA) to determine whether there is an adverse effect on the integrity of a site, are collectively referred to as the Habitats Regulations Assessment (HRA). The HRA refers only to sites within UK jurisdiction.

### 1.3. RIES and Statutory Consultation

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

Natural England is the Statutory Nature Conservation Body (SNCB) for England and for English waters within the 12 nm limit. The Joint Nature Conservation Committee (JNCC) is the SNCB beyond 12 nm,



but this duty has been discharged by Natural England following the 2013 Triennial Review of both organisations<sup>3</sup> <sup>4</sup>. However, JNCC retains responsibility as the statutory advisor for protected sites that are located outside the territorial sea and UK internal waters (i.e. more than 12 nm offshore) and as such continues to provide advice to Natural England on the significance of any potential effects on interest features of such sites.

The ExA prepared a Report on the Implications for European Sites (RIES), with support from the Planning Inspectorate's Environmental Services Team. The RIES was based on matrices provided by the Applicant and relevant information provided by Interested Parties. The RIES documented the information received during the Examination (up until 19 February 2021) and presented the ExA's understanding of the main facts regarding the HRA to be carried out by the Secretary of State.

The RIES was published on PINS planning portal website and the ExA notified Interested Parties that it had been published [PD-033, updated at PD-051]. Consultation on the RIES was undertaken between 4<sup>th</sup> March 2021 and 16<sup>th</sup> June 2021. The RIES was issued to ensure that Interested Parties, including the SNCBs, were consulted formally on habitat regulations matters, as required under regulation 63(3) of the Habitats Regulations and regulation 28(4) of the Offshore Habitats Regulations.

The Secretary of State is content to accept the ExA's recommendation that the RIES, and consultation on it, represents an appropriate body of information to enable the Secretary of State to fulfil his duties in respect of the UK's national site network.

In addition, this HRA has been compiled using evidence from the application documents and consultation responses, which are available on the Planning Inspectorate's Nationally Significant Infrastructure Project web pages<sup>3</sup>. In particular:

- The ExA's Report
- The Applicant's ES
- The Applicant's Habitats Regulations Assessment Report

Key information from these documents is summarised in this HRA.

<sup>3</sup> <https://www.gov.uk/government/publications/triennial-review-of-the-environment-agency-ea-and-natural-england-ne>

<sup>4</sup> <https://www.gov.uk/government/publications/triennial-review-of-the-joint-nature-conservation-committee-jncc>

## 2. Development Description

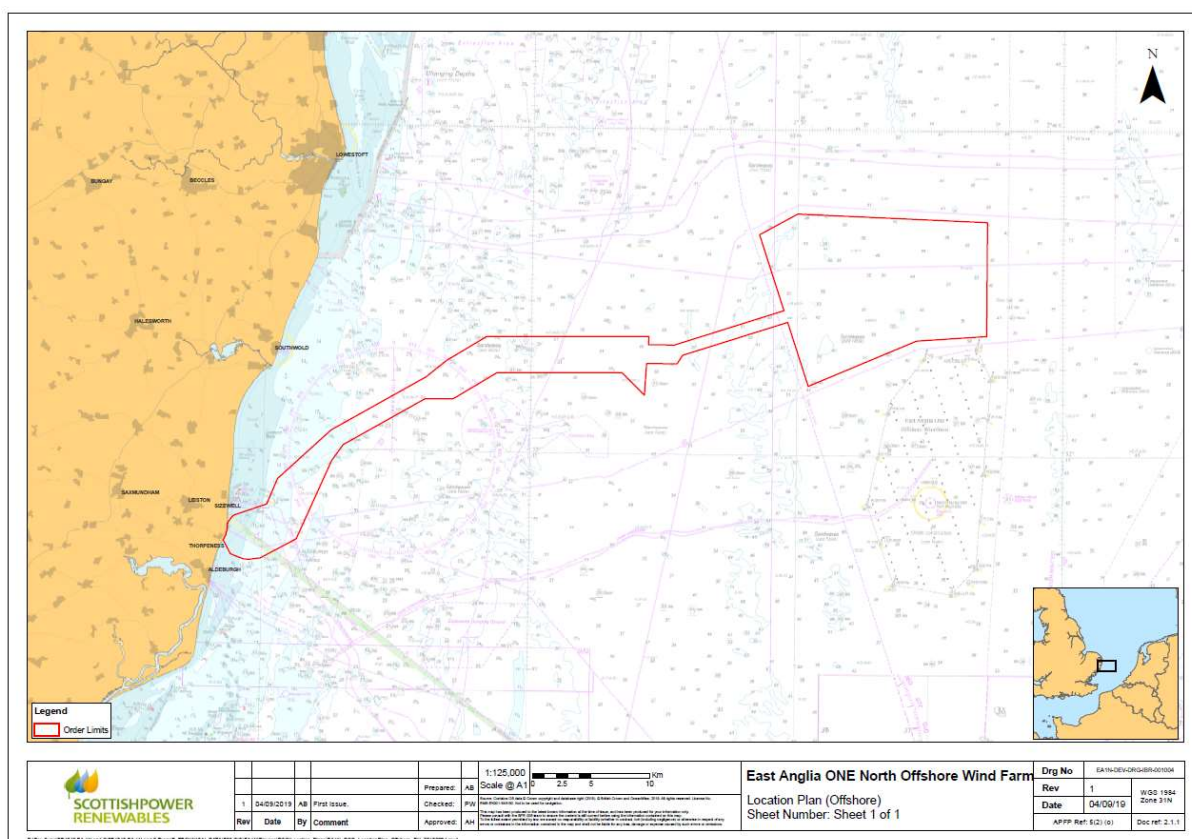
The Project proposes the construction and operation of up to 67 WTGs with a maximum tip height of up to 282 m, together with up to four offshore electrical platforms, an offshore construction, operation and maintenance platform, a meteorological mast, inert-array cables linking the WTGs to each other and to the offshore electrical platforms, platform link cables and up to two export cables to take the electricity generated by the WTGs from the offshore electrical platforms to landfall. See Figure 1 for location of offshore infrastructure.

The onshore works include landfall connection works north of Thorpeness in Suffolk, underground cables running from landfall to a new onshore substation located at Grove Wood, Friston, Suffolk together with a new National Grid substation and National Grid overhead line realignment works including the reconstruction and/or relocation of up to three pylons, construction of up to one additional pylon and the construction of up to three permanent sealing end compounds (Figure 2).

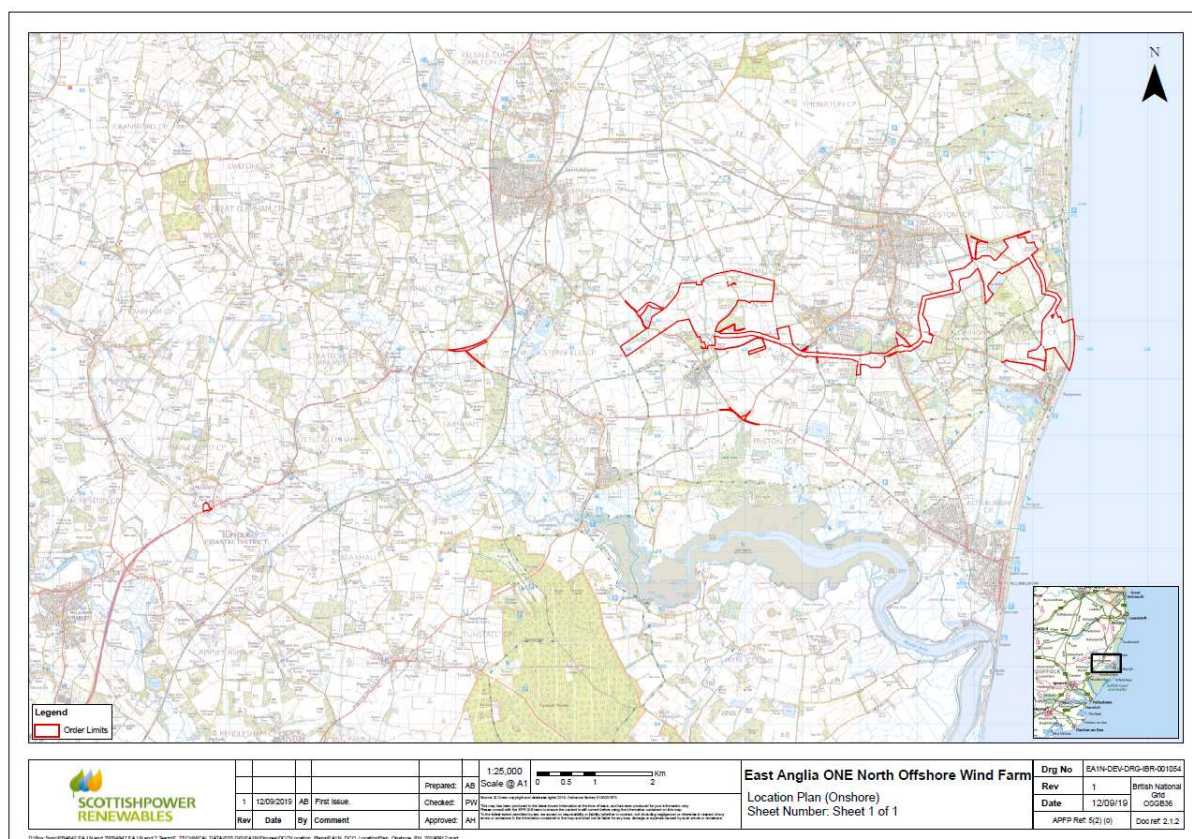
The Applicant has submitted a separate DCO application for the East Anglia Two Offshore Wind Farm (OWF) alongside this application for the proposed East Anglia One North project. The onshore development area, which includes landfall location, onshore cable route, onshore substation location and National Grid infrastructure, has been developed to allow for the construction of both the proposed East Anglia One North and East Anglia Two projects. At this stage it is not known whether both projects would be constructed simultaneously or sequentially. Therefore, the onshore topic assessments will include two cumulative assessment scenarios which are considered to represent the two worst case scenarios for construction of the onshore infrastructure:

- Scenario 1: The proposed East Anglia One North and East Anglia Two projects being built simultaneously.
- Scenario 2: The proposed East Anglia One North and East Anglia Two projects being built sequentially.

## East Anglia One North Habitats Regulations Assessment



**Figure 1: Proposed location of the Project (offshore)**



**Figure 2: Proposed location of the Project (onshore)**

### 3. Likely Significant Effects Test

Under regulation 63 of the Habitats Regulations and regulation 28 of the Offshore Habitats Regulations, the Secretary of State must consider whether a project will have a likely significant effect (LSE), either alone or in-combination with other plans or projects on each of the interest features of the protected sites identified in the RIES.

The purpose of this section is to identify any LSEs on protected sites and to record the Secretary of State's conclusions on the need for an AA and his reasons for including activities, sites or plans and projects for further consideration in the AA.

Of all the protected sites identified during Examination, the ExA concluded that LSEs could not be excluded for the following 15 sites and their qualifying features, either alone or in-combination with other plans or projects, based on the final version of the Applicant's HRA Report (HRAR) [APP-043].

- Alde-Ore Estuary SPA
- Alde-Ore Estuary Ramsar site
- Breydon Water SPA
- Breydon Water Ramsar site
- Broadland SPA
- Broadland Ramsar site
- Flamborough and Filey Coast SPA
- Greater Wash SPA
- Humber Estuary SAC
- North Norfolk Coast SPA
- North Norfolk Coast Ramsar site
- Outer Thames Estuary SPA
- Sandlings SPA
- Southern North Sea SAC
- The Wash and North Norfolk Coast SAC

The Applicant's conclusion of LSEs on these protected sites and their qualifying features was not disputed by any Interested Parties during the Examination. Decommissioning impacts were assumed to be similar to those predicted during construction.

The potential for LSE was considered further only where a potential pathway for effects could be identified for individual site features. As the detailed design of the proposed development has yet to be finalised, the zone of influence associated with the Project was defined by the Applicant based on design parameters stated in the Applicant's assessments to represent the maximum adverse scenario for each parameter. Changes to some of these parameters were made during Examination with the intention of mitigating adverse effects.

Protected sites outside of the UK's National Site Network were considered in the Applicant's screening exercise, however, no potential impacts on sites in European Economic Area (EEA) were identified. This HRA only addresses protected sites which form part of the UK's National Site Network.

Table 1 summarises the features for which significant effects, either alone or in-combination, cannot be excluded for each site. The RIES and the Applicant's final HRA Report provide further information on sites and features which were considered, but for which LSE were screened out.

The Applicant's conclusion of LSE on the protected sites identified and their qualifying features were not disputed by any IPs during the Examination. Natural England confirmed agreement with the scope and



conclusions of the HRA Screening Assessment and raised no concerns in its Relevant Representation (RR) regarding sites and features for which no LSE was concluded.

Natural England commented on the Applicant's approach to combining screening of the Alde-Ore Estuary SPA and Ramsar site, noting that the seabird assemblage is a feature of the Ramsar site only. The Applicant explained that the update to the screening removed the reference to the seabird assemblage feature of the Alde-Ore Estuary Ramsar and that this was included in error. However, the updated document continued to present the feature as 'screened-in' for LSE. Natural England did not provide further comment but referred to the relevant Statement of common ground in its response which stated agreement with the screening exercise.

The final Statement of common ground between the Applicant and Natural England stated that Alde-Ore Estuary SPA should be screened in for LSE and further assessed with regards to lesser black-backed gull ("LBBG") but did not include reference to the Ramsar site. From the information presented by the Applicant and responses to Natural England, the ExA was satisfied that the features of concern are the same for the SPA and Ramsar site and that both designations have been adequately assessed for LSE.

**Table 1: Protected sites for which LSE cannot be excluded, when the Project is considered alone and in combination with other plans or projects, on the listed qualifying features (from the ExA's Recommendations Report).**

Name of protected site	Qualifying features	Effects
Alde-Ore Estuary SPA and Ramsar	Breeding lesser black-backed gull <i>Larus fuscus</i>	Collision mortality during operational phase (alone and in-combination)
Breydon Water SPA and Ramsar	Wintering and passage bird assemblage	Collision mortality during operational phase (alone and in-combination)
Broadland SPA and Ramsar	Wintering and passage bird assemblage	Collision mortality during operational phase (alone and in-combination)
North Norfolk Coast SPA and Ramsar	Wintering and passage bird assemblage	Collision mortality during operational phase (alone and in-combination)
Flamborough and Filey Coast SPA	Breeding kittiwake <i>Rissa tridactyla</i>	Collision mortality during operational phase (alone and in-combination)
	Breeding gannet <i>Morus bassanus</i>	Collision mortality during operational phase (alone and in-combination) Displacement and/or disturbance during operational phase (alone and in-combination)
	Breeding razorbill <i>Alca torda</i> Breeding guillemot <i>Uria aalge</i>	Displacement and/or disturbance during operational phase (alone and in-combination)
Greater Wash SPA	Non-breeding red-throated diver <i>Gavia stellata</i>	Displacement and/ or disturbance during construction and operational phases (alone and in-combination)
	Non-breeding little gull <i>Hydrocoloeus minutus</i>	Collision mortality during operational phase (alone and in-combination)
Outer Thames Estuary SPA	Non-breeding red-throated diver	Collision mortality during operational phase (alone and in-combination) Displacement and/or disturbance during construction, operational and decommissioning phases (alone and in-combination) Barrier effect during construction, operation and decommissioning phases (alone and in-combination)

Name of protected site	Qualifying features	Effects
Sandlings SPA	Breeding nightjar Breeding woodlark	Habitat loss during construction, operational and decommissioning phases (alone and in-combination) Displacement and/or disturbance during construction, operational and decommissioning phases (alone and in-combination)
Humber Estuary SAC	Grey seal <i>Halichoerus grypus</i>	Disturbance from underwater noise during construction, operational and decommissioning phases (alone and in-combination) Vessel interactions and disturbance at haul out sites during construction, operational and decommissioning phases (alone and in-combination) Changes to water quality during construction, and decommissioning phases (alone and in-combination)
Southern North Sea SAC	Harbour porpoise <i>Phocoena phocoena</i>	Underwater noise during construction, operational and decommissioning phases (alone and in-combination) Vessel interactions during construction, operational and decommissioning phases (alone and in-combination) Changes to water quality during construction, and decommissioning phases (alone and in-combination)
The Wash and North Norfolk Coast SAC	Harbour seal <i>Phoca vitulina</i> Grey seal	Disturbance from underwater noise during construction, operational and decommissioning phases (alone and in-combination) Vessel interactions and disturbance at haul out sites during construction, operational and decommissioning phases (alone and in-combination) Changes to water quality during construction, and decommissioning phases (alone and in-combination)

The ExA was satisfied that the Applicant's final HRA Report identified all the LSE that could result from the Project alone or in-combination with other plans or projects and this was not disputed by any interested parties.

The Secretary of State has considered the potential effects of the Application on all relevant qualifying features of the protected sites listed above, with consideration to their conservation objectives, to determine whether there will be LSEs in the context of the Habitats Regulations and the Offshore Habitats Regulations.

### 3.1. Likely Significant Effects Alone Assessment

The Secretary of State agrees with the recommendations of the ExA and concludes that LSEs cannot be excluded at the sites listed in Under regulation 63 of the Habitats Regulations and regulation 28 of the Offshore Habitats Regulations, the Secretary of State must consider whether a project will have a likely significant effect (LSE), either alone or in-combination with other plans or projects on each of the interest features of the protected sites identified in the RIES.

The purpose of this section is to identify any LSEs on protected sites and to record the Secretary of State's conclusions on the need for an AA and his reasons for including activities, sites or plans and projects for further consideration in the AA.

Of all the protected sites identified during Examination, the ExA concluded that LSEs could not be excluded for the following 15 sites and their qualifying features, either alone or in-combination with other plans or projects, based on the final version of the Applicant's HRA Report (HRAR) [APP-043].

- Alde-Ore Estuary SPA
- Alde-Ore Estuary Ramsar site
- Breydon Water SPA
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- Broadland SPA
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- Flamborough and Filey Coast SPA
- Greater Wash SPA
- Humber Estuary SAC
- North Norfolk Coast SPA
- North Norfolk Coast Ramsar site
- Outer Thames Estuary SPA
- Sandlings SPA
- Southern North Sea SAC
- The Wash and North Norfolk Coast SAC

The Applicant's conclusion of LSEs on these protected sites and their qualifying features was not disputed by any Interested Parties during the Examination. Decommissioning impacts were assumed to be similar to those predicted during construction.

The potential for LSE was considered further only where a potential pathway for effects could be identified for individual site features. As the detailed design of the proposed development has yet to be finalised, the zone of influence associated with the Project was defined by the Applicant based on design parameters stated in the Applicant's assessments to represent the maximum adverse scenario for each parameter. Changes to some of these parameters were made during Examination with the intention of mitigating adverse effects.

Protected sites outside of the UK's National Site Network were considered in the Applicant's screening exercise, however, no potential impacts on sites in European Economic Area (EEA) were identified. This HRA only addresses protected sites which form part of the UK's National Site Network.

Table 1 summarises the features for which significant effects, either alone or in-combination, cannot be excluded for each site. The RIES and the Applicant's final HRA Report provide further information on sites and features which were considered, but for which LSE were screened out.

The Applicant's conclusion of LSE on the protected sites identified and their qualifying features were not disputed by any IPs during the Examination. Natural England confirmed agreement with the scope and conclusions of the HRA Screening Assessment and raised no concerns in its Relevant Representation (RR) regarding sites and features for which no LSE was concluded.

Natural England commented on the Applicant's approach to combining screening of the Alde-Ore Estuary SPA and Ramsar site, noting that the seabird assemblage is a feature of the Ramsar site only. The Applicant explained that the update to the screening removed the reference to the seabird assemblage feature of the Alde-Ore Estuary Ramsar and that this was included in error. However, the updated document continued to present the feature as 'screened-in' for LSE. Natural England did not provide further comment but referred to the relevant Statement of common ground in its response which stated agreement with the screening exercise.

The final Statement of common ground between the Applicant and Natural England stated that Alde-Ore Estuary SPA should be screened in for LSE and further assessed with regards to lesser black-backed gull ("LBBG") but did not include reference to the Ramsar site. From the information presented by the Applicant and responses to Natural England, the ExA was satisfied that the features of concern are the same for the SPA and Ramsar site and that both designations have been adequately assessed for LSE.

Table 1: Protected sites for which LSE cannot be excluded, when the Project is considered alone and in combination with other plans or projects, on the listed qualifying features (from the ExA's Recommendations Report)., when the Project is considered alone.

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

### 3.2. Likely Significant Effects In-Combination Assessment

Under the Habitats Regulations and the Offshore Habitat Regulations, the Secretary of State is obliged to consider whether other plans or projects in-combination with the Project might affect protected sites. In this case there are several other plans or projects which could potentially affect some of the same protected sites.

The approach used by the Applicant to assess in-combination effects was to select plans or projects which may affect the designated site feature under consideration.

The sites listed in Under regulation 63 of the Habitats Regulations and regulation 28 of the Offshore Habitats Regulations, the Secretary of State must consider whether a project will have a likely significant effect (LSE), either alone or in-combination with other plans or projects on each of the interest features of the protected sites identified in the RIES.

The purpose of this section is to identify any LSEs on protected sites and to record the Secretary of State's conclusions on the need for an AA and his reasons for including activities, sites or plans and projects for further consideration in the AA.

Of all the protected sites identified during Examination, the ExA concluded that LSEs could not be excluded for the following 15 sites and their qualifying features, either alone or in-combination with other plans or projects, based on the final version of the Applicant's HRA Report (HRAR) [APP-043].

- Alde-Ore Estuary SPA
- Alde-Ore Estuary Ramsar site
- Breydon Water SPA
- Breydon Water Ramsar site
- Broadland SPA
- Broadland Ramsar site
- Flamborough and Filey Coast SPA
- Greater Wash SPA
- Humber Estuary SAC
- North Norfolk Coast SPA
- North Norfolk Coast Ramsar site
- Outer Thames Estuary SPA
- Sandlings SPA
- Southern North Sea SAC
- The Wash and North Norfolk Coast SAC



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The Applicant's conclusion of LSEs on these protected sites and their qualifying features was not disputed by any Interested Parties during the Examination. Decommissioning impacts were assumed to be similar to those predicted during construction.

The potential for LSE was considered further only where a potential pathway for effects could be identified for individual site features. As the detailed design of the proposed development has yet to be finalised, the zone of influence associated with the Project was defined by the Applicant based on design parameters stated in the Applicant's assessments to represent the maximum adverse scenario for each parameter. Changes to some of these parameters were made during Examination with the intention of mitigating adverse effects.

Protected sites outside of the UK's National Site Network were considered in the Applicant's screening exercise, however, no potential impacts on sites in European Economic Area (EEA) were identified. This HRA only addresses protected sites which form part of the UK's National Site Network.

Table 1 summarises the features for which significant effects, either alone or in-combination, cannot be excluded for each site. The RIES and the Applicant's final HRA Report provide further information on sites and features which were considered, but for which LSE were screened out.

The Applicant's conclusion of LSE on the protected sites identified and their qualifying features were not disputed by any IPs during the Examination. Natural England confirmed agreement with the scope and conclusions of the HRA Screening Assessment and raised no concerns in its Relevant Representation (RR) regarding sites and features for which no LSE was concluded.

Natural England commented on the Applicant's approach to combining screening of the Alde-Ore Estuary SPA and Ramsar site, noting that the seabird assemblage is a feature of the Ramsar site only. The Applicant explained that the update to the screening removed the reference to the seabird assemblage feature of the Alde-Ore Estuary Ramsar and that this was included in error. However, the updated document continued to present the feature as 'screened-in' for LSE. Natural England did not provide further comment but referred to the relevant Statement of common ground in its response which stated agreement with the screening exercise.

The final Statement of common ground between the Applicant and Natural England stated that Alde-Ore Estuary SPA should be screened in for LSE and further assessed with regards to lesser black-backed gull ("LBBG") but did not include reference to the Ramsar site. From the information presented by the Applicant and responses to Natural England, the ExA was satisfied that the features of concern are the same for the SPA and Ramsar site and that both designations have been adequately assessed for LSE.

Table 1 are taken forward to the AA to consider whether the Project in-combination with other plans or projects will result in an adverse effect upon the integrity of these sites.

## 4. Appropriate Assessment Methodology

The requirement to undertake an AA is triggered when a competent authority, in this case the Secretary of State, determines that a plan or project is likely to have a significant effect on a protected site either alone or in-combination with other plans or projects. Guidance issued by Defra states that the purpose of an AA is to assess the implications of the plan or project in respect of the site's conservation objectives, either individually or in-combination with other plans and projects, and that the conclusions should enable the competent authority to ascertain whether the plan or project will adversely affect the integrity of the site concerned. The focus is therefore specifically on the species and/or habitats for which the protected site is designated<sup>5</sup>.

The purpose of this AA is to determine whether adverse effects on the integrity of the features of the sites identified can be ruled out as a result of the Application alone or in-combination with other plans and projects in view of the site's conservation objectives and using the best scientific evidence available.

If the competent authority cannot ascertain the absence of an adverse effect on integrity with 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 are identified.

### 4.1. Conservation Objectives

Defra Guidance indicates that disturbance to a species or deterioration of a protected site must be considered in relation to the integrity of that site and its conservation objectives<sup>6</sup>. It states that *"the integrity of a site is the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was designated"*.

As required by the Directives, conservation objectives have been established by Natural England. When met, each site will contribute to the overall favourable conservation status of the species or habitat feature across its natural range. Conservation objectives outline the desired state for a protected 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. There are no set thresholds at which impacts on site integrity are considered 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.

Natural England has issued generic conservation objectives, which should be applied to each interest feature of the site. Supplementary advice for each site underpins these generic objectives to provide site-specific information and give greater clarity to what might constitute an adverse effect on a site interest feature. Supplementary advice on conservation objectives is subject to availability and is currently being updated on a rolling basis.

Where supplementary advice is not yet available for a site, Natural England advises that HRAs should use the generic objectives and apply them to the site-specific situation. For SPAs, the overarching objective is to avoid the deterioration of the habitats of qualifying features, and the significant disturbance

<sup>5</sup> <https://www.gov.uk/guidance/appropriate-assessment#what-must-an-appropriate-assessment-contain>

<sup>6</sup> <https://www.gov.uk/guidance/appropriate-assessment#what-must-an-appropriate-assessment-contain>

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. This is achieved by, subject to natural change, maintaining and restoring:

- The extent and distribution of the habitats of the qualifying features.
- The structure and function of the habitats of the qualifying features.
- The supporting processes on which the habitats of the qualifying features rely.
- The populations of the qualifying features.
- The distribution of the qualifying features within the site.

For SACs, the overarching objective is to avoid the deterioration of the qualifying natural habitats and the habitats of qualifying species, and the significant disturbance of those qualifying species, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving favourable conservation status of each of the qualifying features. This is achieved by, subject to natural change, maintaining and restoring:

- The extent and distribution of the qualifying natural habitats and habitats of qualifying species.
- The structure and function (including typical species) of qualifying natural habitats.
- The structure and function of the habitats of qualifying species.
- The supporting processes on which qualifying natural habitats and habitats of qualifying species rely.
- The populations of qualifying species.
- The distribution of qualifying species within the site.

The conservation objectives and, where available, supplementary advice on conservation objectives have been used by the Secretary of State to consider whether the Project has the potential to have an adverse effect on the integrity of sites, either alone or in-combination with other plans or projects. The potential for the Project to have an adverse effect on site integrity is considered for each site in turn.

### 4.2. In-Combination Assessment Methodology

The Applicant addressed potential in-combination effects within [APP-044] which sets out the methodology applied. In accordance with the PINS Advice Note Ten: Habitats Regulations Assessment (Version 8, November 2017) the following projects and plans listed below are considered within the assessment noting that projects that are submitted but not yet determined, in appeal, on the National Infrastructure's programme, or identified in a development plan will have carry less weight in the assessment than those projects that are operational, under construction or consented.

- Projects that are operational
- Projects that are under construction;
- Permitted application(s) not yet implemented;
- Submitted application(s) not yet determined;
- All refusals subject to appeal procedures not yet determined;
- Projects on the National Infrastructure's programme of projects; and
- Projects identified in the relevant development plan (and emerging development plans – with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited and the degree of uncertainty which may be present.

### 4.3. Sites which the Applicant and SNCBs Agree No Adverse Effect on Integrity

The Applicant's HRA Report and Integrity Matrices [APP-046] concluded that the Project would not result in an adverse effect on integrity of the following sites within the UK's National Site Network:

- Breydon Water SPA and Ramsar site;
- Broadland SPA and Ramsar site;
- Greater Wash SPA;
- North Norfolk Coast SPA and Ramsar site;
- Humber Estuary SAC; and
- The Wash and North Norfolk Coast SAC.

No IPs raised any concerns in relation to the Applicant's conclusions for these sites and features. Natural England confirmed that it agreed to exclude an adverse effect on integrity on the above UK National Site Network sites listed above [REP8-166]. The ExA was satisfied that an adverse effect on integrity on these sites and their qualifying features can be excluded.

The Applicant also concluded no adverse effect on integrity on the following sites:

- Alde-Ore Estuary SPA and Ramsar site;
- Flamborough and Filey Coast SPA;
- Outer Thames Estuary SPA;
- Southern North Sea SAC; and
- Sandlings SPA.

Several of the Applicant's conclusions of no adverse effect on integrity on the protected sites listed above were disputed by IPs and remained in discussion throughout the Examination. The Secretary of State has considered these in more detail in Section **Error! Reference source not found.**

### 4.4. Offshore Ornithology

The following Sections explain how the impacts of the Project on birds have been quantified and assessed through the modelling of collision and displacement risks.

#### 4.4.1. Collision Risk Modelling

Collision mortality is an impact-effect pathway that was assessed for the qualifying features of the Alde-Ore Estuary SPA and Ramsar site for breeding lesser black-backed gull, and the Flamborough and Filey Coast SPA for breeding kittiwake and gannet. The collision risk modelling (CRM) input parameters were provided by the Applicant in Technical Appendix 12.2 Annex 3 of Chapter 12 Offshore Ornithology of the Environmental Statement. The complete CRM results for each ornithological feature assessed were provided in Technical Appendix 12.2 Annexes 4 and 7 [APP-470].

The Applicant used Option 2 of the Band (2012) model. The Applicant stated that the use of Option 2 was agreed with Natural England and the Royal Society for the Protection of Birds (RSPB) through the Evidence Plan process (Appendix 12.1 of Chapter 12 Offshore Ornithology [APP-470]). However, in their relevant representations, Natural England expressed preference for the use of Option 1 of the Band model as a more precautionary method capable of ensuring the worst-case scenario collision mortalities were assessed [RR-059]. In response, the Applicant confirmed that the use of the Option 2 had been agreed with Natural and the RSPB because no sufficient robust site-specific estimates of seabird height could be established for use in the Option 1 Band model (Appendix 12.1 [APP-060] and [AS-036]. Natural England acknowledged that the use of Option 2, which uses generic height data, was agreed with the Applicant and the RSPB [REP1-171].

The Applicant submitted several updates to the in-combination collision risk estimates in relation to lesser black-backed gulls (Alde-Ore Estuary SPA and Ramsar site) and kittiwake and gannet (Flamborough and Filey Coast SPA) in response to matters raised during Examination. In summary, updates were made to capture a revised apportioning methodology in relation to lesser black-backed gulls; changes to the data applied to the in-combination projects; and changes to the parameters of the Project (see Chapter 2 and Chapter 18 of the ExA's Report).

### 4.4.2. Mitigation: Air-Draught Increases

In response to its concerns regarding the impacts of wind farms on North Sea seabird populations, Natural England recommended that the Applicant consider raising the minimum height of the turbine blades above sea level to increase the air-draught and reduce collision risk.

The Applicant confirmed that the minimum height would be increased by 2 m, to 24 m above Mean High Water Springs (MHWS), and that this would reduce the number of birds at risk of collision. This change would be reflected in the revised draft Development Consent Order (DCO) [REP1-047].

Natural England and the RSPB welcomed this change but encouraged further increases to the minimum air-draught height to achieve greater reduction in potential collision risk impacts [REP2-052, REP8-105].

The Applicant stated that increasing the minimum air-draught height further would have implications on technical aspects of the Project and was constrained by the site conditions [REP3-053, EV-034b]. The Applicant concluded that further increases of up to 30 m would be technically possible, but would have a prohibitive commercial impact on the Project [REP6-044, REP6-061, REP12-059].

The Applicant did not seek to introduce further increases in air-draught height during Examination. No specific comments from the RSPB on the Applicant's explanation of why further increases would not be achievable were received by the end of Examination and the matter was categorised as "*Not agreed*" in the Statement of Common Ground [REP8-105]. Natural England did not comment further on this matter.

### 4.4.3. Monitoring

Monitoring for all offshore marine and ornithological qualifying features assessed in the HRA was included in the Applicant's final Offshore In-Principle Monitoring Plan (IPMP) [APP-590] updated at [REP3-040, REP6-015, and REP8-027]. The In-Principle Site Integrity Plan (IPSIP) also committed the final Site Integrity Plan (SIP) to include any monitoring required to assess the effectiveness of mitigation measures relating to the Southern North Sea SAC. The IPMP included construction noise monitoring in relation to marine mammals, pre-construction monitoring for red-throated diver, as well as post-consent monitoring for all ornithology features.

The provision of a monitoring plan which accords with the certified IPMP prior to commencement of licensed activities is secured by the conditions of the DMLs.

## 5. Appropriate Assessment

### 5.1. Appropriate Assessment: Alde-Ore Estuary SPA and Ramsar

The Alde-Ore Estuary SPA and Ramsar covers 2,417 ha on the Suffolk coast. It is approximately 52 km from the Project at the closest point.

Alde-Ore Estuary qualifies as an SPA by regularly supporting the following populations of Annex I species of European importance: breeding populations of little tern, marsh harrier and Sandwich tern; and breeding and wintering avocet. The site also qualifies by supporting two Annex II species: wintering redshanks and breeding lesser black-backed gull, as well as a breeding seabird assemblage of international importance, and a wintering waterbird assemblage of international importance.

Alde-Ore Estuary Ramsar, which is coincident with the SPA, qualifies under Ramsar Criterion 2a for nationally scarce plants and British Red Data Book invertebrates; Criterion 3b for a notable assemblage of breeding and wintering wetland birds; and Criterion 3c for breeding lesser black-backed gull; and wintering redshank and avocet.

No works for the Project will take place within the SPA, but the lesser black-backed gull is estimated to have a mean breeding season foraging range of 72 km, a mean maximum range of 141 km, and a maximum recorded range of 181 km<sup>7</sup>. It is therefore possible that breeding adults from Alde-Ore Estuary SPA may forage within the Project site, as well as other OWF sites. As lesser black-backed gulls fly at rotor swept height, there is a risk of mortalities from collision with turbine blades.

The Secretary of State has considered the potential for the Project to have an adverse effect on site integrity for each feature for which a significant effect is likely. A potential LSE was identified for the lesser black-backed gull feature from collision mortalities alone and in-combination, during the operational phase of the Project.

In addition to the generic conservation objectives for SPAs presented in Section 4.1, specific targets for the Alde-Ore Estuary SPA, relating to lesser black-backed gull, include:

- Restoring the size of the breeding population to a level which is above 14,074 whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.
- Maintaining safe passage of birds moving between nesting and feeding areas.
- Reducing the frequency, duration and/ or intensity of disturbance affecting roosting, nesting, foraging, feeding, moulting and/ or loafing birds so that they are not significantly disturbed.
- Reducing predation and disturbance caused by native and non-native predators<sup>8</sup>.

#### 5.1.1. Lesser Black-Backed Gull Collision Mortality: Alone

The Applicant predicted lesser black-backed gull collision mortalities using Option 2 of the Band (2012) CRM, using an avoidance rate of 99.5%. The annual average mortality was estimated to be 0.3 birds. The natural mortality for the SPA population (assuming approximately 4,000 adults) is c.460 individuals, assuming an average adult mortality rate of 11.5% [APP-043]. Therefore, an additional mortality of 0.3 birds due to collisions would only increase the mortality rate by 0.06%, which is below the 1% threshold

<sup>7</sup> Thaxter, C. B., Lascelles, B., Sugar, K., Cook A., Roos, S., Bolton, M., Langston, R. and Burton, N. (2012a): *Seabird Foraging Ranges as a Preliminary Tool for Identifying Candidate Marine Protected Areas*. Biological Conservation, 156, 53-61.

<sup>8</sup><https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9009112&SiteName=alde-ore&SiteNameDisplay=Alde-Ore+Estuary+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=8>



advised by the SNCBs as the point at which effects are detectable. This increase was considered unlikely to result in a significant effect and therefore an adverse effect on the integrity of the site for the Project alone was excluded. This conclusion was agreed with Natural England and documented in the Statement of Common Ground [REP1-058], [REP8-110].

The Secretary of State is satisfied that an adverse effect on the integrity of the Alde-Ore Estuary SPA and Ramsar from the effects of lesser black-backed gull collision mortality from the Project alone can be excluded.

### **5.1.2. Lesser Black-Backed Gull Collision mortality: In-combination**

In relation to in-combination effects, it was estimated that 44 collision mortalities would be apportioned to the SPA each year when the impacts of other OWFs were considered. The final list of Projects included in the in-combination assessment is presented in [REP1-047]. The additional in-combination mortalities would increase the background mortality rate by 9.5%.

In its final advice [REP13-048] Natural England stated that it was unable to rule out an adverse effect on the integrity of the site from collision mortalities of lesser black-backed gulls.

The Secretary of State notes that the conservation objectives for the SPA require restoration of the lesser black-back gull population to the level for which it was designated and any adverse impacts on the population are likely to prevent or delay the achievement of the objectives. The Secretary of State concludes that collision effects could undermine the conservation objectives for lesser black-backed gull and therefore an adverse effect on the integrity of the Alde-Ore Estuary SPA and Ramsar from the effects of lesser black-backed gull collision mortality from the Project in-combination with other projects cannot be excluded.

## **5.2. Appropriate Assessment: Flamborough and Filey Coast SPA**

The Flamborough and Filey Coast SPA covers 8,040 ha of the North Yorkshire coast, including approximately 7,472 ha of marine habitats. It is located approximately 246 km from the Project at the closest point.

Flamborough and Filey Coast qualifies as an SPA by supporting over 1% of the biogeographical populations of four regularly occurring migratory species: kittiwake (estimated breeding population of 44,520 pairs), gannet (8,469 pairs), guillemot (41,607 pairs) and razorbill (10,570 pairs). It also qualifies for its breeding seabird assemblage (c.216,730 individuals), which is of European importance. The breeding seabird assemblage comprises herring gull, fulmar, shag, cormorant, and puffin, as well as the gannet, kittiwake, guillemot, and razorbill populations detailed above.

In addition to the generic conservation objectives for SPAs presented in Section 4.1. Natural England has provided supplementary conservation objectives for the individual qualifying features of the site, which include:

- Restoring the size of the kittiwake breeding population to above 83,700 pairs, whilst avoiding deterioration from the current level indicated by the latest mean peak count or equivalent.
- Maintaining the size of the gannet breeding population to above 8,469 pairs, whilst avoiding deterioration from the current level indicated by the latest mean peak count or equivalent.
- Maintaining the size of the razorbill breeding population above 10,570 pairs, whilst avoiding deterioration from the current level indicated by the latest mean peak count or equivalent.
- Maintaining the size of the guillemot breeding population to above 41,607 pairs whilst, avoiding deterioration from the current level indicated by the latest mean peak count or equivalent.

- Maintaining the overall abundance of the seabird assemblage above 216,730 individuals, whilst avoiding deterioration from the current level indicated by the latest mean peak count or equivalent.
- Maintaining the diversity of the seabird assemblage: the total number of species should not be reduced.

No works for the Project will take place within the SPA; however, due to the location of the Project, birds from the SPA may forage within the Project site and other OWFs. These birds may be impacted by collision, disturbance and displacement from the Project.

The Secretary of State has considered the potential for the Project to constitute an adverse effect on site integrity for each feature for which a significant effect is likely.

A LSE from collision mortality was identified for the kittiwake feature during the operational phase of the Project, alone and in-combination with other projects.

A LSE from collision mortality was also identified for the gannet feature of the site, as well as displacement and/or disturbance, alone and in-combination with other projects during the operational phase.

Displacement and/or disturbance during the operational phase was also identified as a LSE for the seabird assemblage, razorbill and guillemot features of the site, alone and in-combination with other projects.

### **5.2.1. Breeding kittiwake collision mortality: Alone**

During the breeding season, adult kittiwakes have an estimated mean maximum foraging range of 60 km<sup>7</sup>. Recent tracking studies of kittiwakes by RSPB (Future of the Atlantic Marine Environment (FAME) and Seabird Tracking and Research (STAR) projects) have recorded longer foraging distances for kittiwakes of up to 231 km.

Since Flamborough and Filey Coast SPA is over 250 km from the Project, the risk of additional mortalities of breeding adults from collision is extremely low: however, kittiwakes from the SPA may be at risk of collision during the migration or wintering seasons.

A CRM based on Option 2 of the Band model using an avoidance rate of 98.9% predicted that the annual collision related mortality for the Project to be 0.7 (95% confidence interval 0.2–1.3) kittiwakes from the SPA.

This increase was considered unlikely to result in a significant effect and therefore an adverse effect on the integrity of the site from the Project alone was excluded. This conclusion was agreed with Natural England and documented in the Statement of Common Ground [REP8-110].

The Secretary of State is satisfied that an adverse effect on the integrity of the Flamborough and Filey Coast SPA, from the effects of kittiwake collision mortality from the Project alone can be excluded.

### **5.2.2. Breeding kittiwake collision mortality: In combination**

In relation to in-combination effects, it was estimated that 532.9 collision mortalities would be apportioned to the SPA each year when the impacts of other OWFs were considered. The final list of Projects included in the in-combination assessment is presented in [REP12-066]. The additional in combination mortalities would increase the background mortality rate by 9.5%.

At the close of Examination Natural England considered that the Project would add further bird mortalities to the existing totals which were already causing an adverse effect on the integrity of the SPA; therefore, it could not rule out an adverse effect on the integrity of the SPA from the Project in combination with other projects.



Taking the above matters into account, the Secretary of State concludes that collision effects could undermine the conservation objectives for kittiwake and therefore an adverse effect on the integrity of the Flamborough and Filey Coast SPA from the effects of kittiwake collision mortality from the Project in combination with other projects cannot be excluded.

### 5.2.3. Breeding gannet collision and displacement mortality: Alone

During the breeding season, gannets have an estimated mean maximum foraging range of 229 km<sup>7</sup>. Therefore, it is likely that some breeding gannets from the Bempton colony within Flamborough and Filey Coast SPA will forage at the Project site.

A CRM based on Option 2 of the Band model using an avoidance rate of 98.9% predicted that the annual collision related mortality for the Project would be between 11.8-14.5 gannets from the SPA compared to a background annual mortality of between 1,792 (based on population at designation) to 2,169 (based on the population in 2017). The addition of between 11.8 and 14.5 individuals would therefore increase the mortality rate by 0.7 to 0.8% (designated) and 0.6% to 0.7% (2017 count). If the estimate for the upper 95% confidence estimate and the full breeding season (29) is used, the maximum increase would be between 1.6% and 1.3% (designated and recent counts, respectively). While if the lower 95% confidence estimate is used (3.5) these rates are 0.2% and 0.16%<sup>9</sup>.

The Applicant predicted that the annual displacement mortality of gannet from the SPA would be 1.1 individuals. This was based on a displacement rate of 60-80% and a 1% mortality rate. Assuming an average natural mortality rate of 0.19, the natural annual mortality of the population is between 7,682 (designated) and 9,300 (2017 count). The addition of up to 1.1 individuals would therefore increase the mortality rate by a maximum of 0.01% (designated population).

This increase was considered unlikely to result in a significant effect and therefore an adverse effect on the integrity of the site for the Project alone was excluded. This conclusion was agreed with Natural England and documented in the Statement of Common Ground [REP8-110].

The Secretary of State is satisfied that an adverse effect on the integrity of the Flamborough and Filey Coast SPA from the effects of gannet collision and displacement mortality from the Project alone can be excluded. .

### 5.2.4. Breeding gannet collision and displacement mortality: In-combination

Post-examination, as part of the Applicant's consultation response, an updated in-combination impact assessment was submitted for gannet which excluded the contributions from Hornsea Project Four, Dudgeon Extension and Sheringham Shoal Extension<sup>10</sup>.

The in-combination collision related mortality for gannet from the SPA was estimated to be 293 birds per year. The in-combination displacement mortality for gannet from the SPA was estimated to be 62.3 (80% displacement and 1% mortality) birds per year. The combined mortality impact was estimated by adding the displacement and collision mortality risks together to give a total of 355.3 birds per year.

<sup>9</sup> Scottish Power Renewables (2019): *East Anglia ONE North Offshore Windfarm: Habitats Regulations Assessment (HRA). Information to Support Appropriate Assessment*. Version 1.

<sup>10</sup> Royal HaskoningDHV, Scottish Power Renewables, Shepherd and Wedderburn LLP (November 2021): Reference: ExA.AS-1.SoSQ.V1.

The density-independent PVA results indicate that the maximum reduction in growth rate was 1.58% for an in-combination collision and displacement mortality of 355.3. At this mortality rate the counterfactual population size after 30 years would be 61% of the unimpacted size.

Comparing the in-combination collision and displacement mortality results with and without the Projects, the population growth rate was reduced by 0.13% and the population size was reduced by 2.62%. The Flamborough and Filey Coast SPA population has grown at a rate of at least 10% per year for the last 25 years. The Applicant concluded that a reduction in this growth rate of 1.6% would have very little effect on the population. Natural England agreed that, based on the updated combined in-combination displacement and collision impacts, an adverse effect on the integrity of the gannet feature can be excluded (if the Hornsea Project 4, Dudgeon Extension and Sheringham Shoal Extension are excluded from the totals)<sup>11</sup>.

The Secretary of State notes that the relevant conservation objective is to maintain favourable conservation status of the gannet population, subject to natural change. On the basis of the current gannet population growth rate and the number of predicted collision and displacement mortalities from the Project in-combination with other offshore windfarms, the predicted impacts are not at a level which would trigger a population decline, but would result in a slight reduction in the population growth rate currently seen at this colony.

The Secretary of State is satisfied that an adverse effect on the integrity of the Flamborough and Filey Coast SPA from the effects of gannet collision and displacement mortality from the Project in-combination with other projects can be excluded.

### **5.2.5. Non-breeding guillemot displacement mortality: Alone**

During the breeding season guillemot have a mean maximum foraging range of 84.2 km<sup>7</sup>. Therefore, it is unlikely that breeding guillemot forage at the Project site; however, guillemot from the SPA may be at risk of displacement during the migration and wintering seasons. The Applicant predicted that the annual displacement mortality of guillemot from the SPA would be 5.2 individuals, based on a displacement rate of 70% and a 10% mortality rate. This would result in a 0.1% increase against baseline mortality which would be undetectable.

This increase was considered unlikely to result in a significant effect and therefore an adverse effect on the integrity of the SPA for the Project alone was excluded. This conclusion was agreed with Natural England and documented in the Statement of Common Ground [REP8-110].

The Secretary of State is satisfied that an adverse effect on the integrity of the Flamborough and Filey Coast SPA from the effects of guillemot displacement mortality from the Project alone can be excluded.

### **5.2.6. Non-breeding guillemot displacement mortality: In-combination**

Post-examination, as part of the Applicant's consultation response, an updated in-combination impact assessment was submitted for guillemot, which excluded the contributions from Hornsea Project Four, Dudgeon Extension and Sheringham Shoal Extension.

<sup>11</sup> Natural England (2022): *Appendix 3: Natural England's Comments to the Flamborough and Filey Coast (FFC) SPA PVAs and In-combination Assessments*. 31<sup>st</sup> January 2022.

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The in-combination displacement related mortality for guillemot from the SPA estimated to be 1,748.3 individuals per year, based on a displacement rate of 70% and a 10% mortality rate<sup>12</sup>.

The density-independent PVA results indicate that the maximum reduction in growth rate was 1.62% for an in-combination displacement mortality of 1,748.3 (including the projects and at 70% displaced and 10% mortality). At this mortality the counterfactual population size indicates the guillemot population after 30 years would be 60% of the unimpacted size.

At the lower end of the range (30% displaced and 1% mortality), the Applicant predicted a maximum reduction in growth rate of 0.07% for an in-combination displacement mortality of 74.9. The counterfactual population size for this scale of mortality indicates that after 30 years the guillemot population would be 98% of the unimpacted size.

At the intermediate rates of 70% displaced and 2% mortality (which corresponds to keeping the decrease in growth rate below 0.5%, as suggested by Natural England REP12-090), a maximum reduction in growth rate of 0.32% was obtained for an in-combination displacement mortality of 349.7. The counterfactual population size at this mortality rate indicates the guillemot population after 30 years would be 90% of the unimpacted size.

The Applicant notes that over the last 50 years, the guillemot population at Flamborough and Filey Coast SPA has increased at an annual rate of 4%. Applying the 70% displacement and 2% mortality rates, a maximum reduction in this of 0.32% would be undetectable.

On the basis of the population model predictions, the number of predicted displacement mortalities at the projects in-combination with other projects would only cause a slight reduction in the growth rate currently seen at this colony but this is below the level which might trigger a risk of population decline.

Natural England agreed that, based on the updated in-combination displacement impacts, an adverse effect on the integrity of the guillemot feature can be excluded (if the Hornsea Project 4, Dudgeon Extension and Sheringham Shoal Extension are excluded from the totals)<sup>13</sup>.

The Secretary of State is satisfied that an adverse effect on the integrity of the Flamborough and Filey Coast SPA from the effects of guillemot displacement mortality from the Project in-combination with other projects can be excluded.

### 5.2.7. Non-breeding razorbill displacement mortality: Alone

During the breeding season razorbill have a mean maximum foraging range of 48.5 km<sup>7</sup>. Therefore, it is unlikely that breeding razorbill forage at the Project site; however, razorbill from the SPA may be at risk of displacement during the migration and wintering seasons. The Applicant predicted that the annual displacement mortality of razorbill from the SPA would be 0.7 individuals, based on a displacement rate of 70% and a 10% mortality rate. This would result in a 0.03% increase in the baseline mortality rate, which would be undetectable.

The Applicant considered that this increase was unlikely to result in a significant effect and therefore no adverse effect on the integrity of the razorbill feature of the SPA. This conclusion was agreed with Natural England and documented in the Statement of common ground [REP8-110].

<sup>12</sup> Royal HaskoningDHV, Scottish Power Renewables, Shepherd and Wedderburn LLP. (2021): *East Anglia ONE North and East Anglia TWO Offshore Windfarms Applicants' Responses to the Secretary of State's Questions of 2<sup>nd</sup> November 2021 (Items 4-7)*. 30<sup>th</sup> November 2021

<sup>13</sup> Natural England (2022): *Appendix 3: Natural England's Comments to the Flamborough and Filey Coast (FFC) SPA PVAs and In-combination Assessments*. 31<sup>st</sup> January 2022.

The Secretary of State is satisfied that an adverse effect on the integrity of the Flamborough and Filey Coast SPA from the effects of razorbill displacement mortality from the Project alone can be excluded.

### **5.2.8. Non-breeding razorbill displacement mortality: In-combination**

Post-examination, as part of the Applicant's consultation response, an updated in-combination impact assessment was submitted for razorbill, which excluded the contributions from Hornsea Project Four, Dudgeon Extension and Sheringham Shoal Extension<sup>12</sup>.

The in-combination displacement mortality for razorbill from the SPA was estimated to be between 18.7 (30% displacement and 1% mortality) and 435.4 (70% displacement and 10% mortality) birds per year<sup>16</sup>.

The density-independent PVA results indicate that the maximum reduction in growth rate was 1.27% for an in-combination displacement mortality of 435.4 (including the projects and at 70% displaced and 10% mortality). At this rate of mortality, the counterfactual population size indicates the razorbill population after 30 years would be 67% of the unimpacted size.

At the intermediate rates of 70% displaced and 2% mortality (which corresponds to keeping the decrease in growth rate below 0.5%, as suggested by Natural England REP12-090), a maximum reduction in growth rate of 0.25% was obtained for an in-combination displacement mortality of 87.1. The counterfactual population size at this mortality rate indicates the razorbill population after 30 years would be 92% of the unimpacted size.

The Applicant notes that over the last 50 years, the razorbill population at Flamborough and Filey Coast SPA has increased at an annual rate of 6%. Applying the 70% displacement and 2% mortality rates, a maximum reduction of 0.25% would be undetectable.

On the basis of the population model predictions, the number of predicted displacement mortalities at the projects in-combination with other projects would only cause a slight reduction in the growth rate currently seen at this colony and this is below the level which might trigger a risk of population decline.

Natural England agreed that, based on the updated in-combination displacement impacts, an adverse effect on the integrity of the razorbill feature can be excluded (if the Hornsea Project 4, Dudgeon Extension and Sheringham Shoal Extension are excluded from the totals)<sup>14</sup>.

The Secretary of State is satisfied that an adverse effect on the integrity of the Flamborough and Filey Coast SPA from the effects of razorbill displacement mortality from the Project in-combination with other projects can be excluded.

### **5.2.9. Seabird assemblage: Alone**

The seabird assemblage feature of the Flamborough and Filey Coast SPA, comprises kittiwake, gannet, guillemot, razorbill, fulmar, puffin, herring gull, shag and cormorant. The Applicant confirmed in [REP2-006] that the first four of these species had been assessed separately as individual features, and provided the reasons as to why it considered that there were no pathways for effects for the remaining species (i.e., fulmar, puffin, herring gull, shag, and cormorant).

Natural England agreed that an adverse effect on the seabird assemblage feature of the SPA could be ruled out for the Project alone, as there was no adverse effect on the individual components of the seabird assemblage [REP3-116]. The RSPB supported this position [REP8-105].

<sup>14</sup> Natural England (2022): *Appendix 3: Natural England's Comments to the Flamborough and Filey Coast (FFC) SPA PVAs and In-combination Assessments*. 31<sup>st</sup> January 2022.

The Secretary of State is satisfied that an adverse effect on the integrity of the seabird assemblage feature of the Flamborough and Filey Coast SPA from the Project alone can be excluded.

### 5.2.10. Seabird assemblage: In-combination

The Examination concentrated on the species of kittiwake, gannet, guillemot and razorbill, following agreement in relation to the absence of an LSE on the other species comprising the seabird assemblage qualifying feature.

During the examination, Natural England advised that whilst an adverse effect on the seabird assemblage from in-combination impacts could be ruled out when Hornsea Project 3 and Hornsea Project 4 were excluded from the totals, an adverse effect could not be ruled out when these projects were included because of the uncertainty in the figures for these projects [REP3-116].

At the end of the examination, the ExA was not satisfied that an adverse effect from the in-combination effects on the seabird assemblage could be excluded. This was due to the uncertainty around the information available on the effects of pre-application projects.

Post-examination the Applicant provided updated in-combination models for kittiwake, gannet, guillemot and razorbill<sup>12</sup>. These models included the final totals for Hornsea Project 3, and excluded Hornsea Project 4.

The Secretary of State notes that both species abundance and diversity are considered when assessing the impacts on seabird assemblages. The Secretary of State considers that the impacts on abundance, across the suite of species would not result in a significant reduction of the overall number of seabirds in the assemblage, given that the populations of some species are increasing. Furthermore, the Project in combination with other projects is unlikely to result in a significant risk to the species assemblage, as no one species is likely to be lost.

The Secretary of State is satisfied that an adverse effect on the integrity of the seabird assemblage feature of the Flamborough and Filey Coast SPA from the Project in-combination with other projects can be excluded.

## 5.3. Appropriate Assessment: Outer Thames Estuary SPA

The Outer Thames Estuary covers 3,792 km<sup>2</sup> and is located on the east coast of England. It extends northward from the Thames Estuary to Great Yarmouth on the East Norfolk Coast. The turbine array will be approximately 2 km from the SPA boundary and the export cables will go through the SPA (Figure 3).

The Outer Thames Estuary qualifies as an SPA by regularly supporting wintering populations of the Annex I species red-throated diver which are of European importance.

The Outer Thames Estuary SPA supports the largest aggregation of wintering red-throated diver in the UK. An estimated population of 6,466 individuals, which is 38% of the non-breeding population of Great Britain wintered in the SPA at the time of designation, in 2010. However, the population has increased and is now around 18,079<sup>15</sup>. It also protects foraging areas for common tern and little tern during the breeding season.

<sup>15</sup> Natural England, 2019. Outer Thames Estuary SPA: Supplementary Advice. Available at: <https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9020309&SiteName=outer+thames+estuary&SiteNameDisplay=Outer+Thames+Estuar+y+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAAArea=&NumMarineSeasonality=3>



During the Examination, the Applicant asserted that the red-throated diver feature of the SPA was in favourable condition: however, Natural England advised that marine SPAs have not yet been subject to a formal condition assessment and they cannot confirm whether the site as a whole, or features within it, are in favourable condition or not. Natural England also explained that important habitats or species may be degraded or disturbed at the time when they are given site-based protection and, as such, it should not be assumed that when an SPA is classified, that it is already in favourable condition that need only be maintained at the baseline of its status at the date of classification.

The conservation objective for the Outer Thames Estuary Special Protection Area is to, subject to natural change<sup>16</sup>, maintain<sup>17</sup> or enhance the red-throated diver population and its supporting habitats in favourable condition<sup>18</sup>. The interest feature red-throated diver will be considered to be in favourable condition only when both of the following two conditions are met:

- i. The size of the red-throated diver population is at, or shows only non-significant fluctuation around the mean population at the time of designation of the SPA to account for natural change; and
- ii. The extent of the supporting habitat within the site is maintained.

JNCC and Natural England<sup>19</sup> advise that to fulfil the conservation objectives for wintering red-throated diver and its supporting habitat, human activities should be managed so that they do not result in deterioration or disturbance, or impede the restoration of this feature through any of the following:

- i. Physical loss of habitat by removal (e.g., capital dredging, harvesting, coastal and marine development);
- ii. Physical damage by physical disturbance or abrasion of habitat (e.g., extraction);
- iii. Non-physical disturbance through noise or visual disturbance (e.g., shipping, wind turbines);
- iv. Toxic contamination by introduction of synthetic and/or non-synthetic compounds (e.g., polychlorinated biphenyls (PCBs), pollution from oil and gas industry, shipping);
- v. Non-toxic contamination to prey species only by changes in e.g., turbidity (e.g., capital and maintenance dredging); and
- vi. Biological disturbance by selective extraction of species (e.g., commercial fisheries) and non-selective extraction (e.g., entanglement with netting and wind turbine strike).

<sup>16</sup> Natural change is defined as changes in the species or habitat which are not a result of human influences. Human influence on the red-throated diver population is acceptable provided that it is proved to be/can be established to be compatible with the achievement of the conditions set out under the definition of favourable condition. A failure to meet these conditions, which is entirely a result of natural process will not constitute unfavourable condition, but may trigger a review of the definition of favourable condition.

<sup>17</sup> Maintain is used here because existing evidence suggests the feature to be in favourable condition, and the objective is for it to remain so. Existing activities are deemed to be compatible with the conservation objectives if current practices are continued at current levels and in the absence of evidence that current activities are significantly affecting the red-throated diver population or its habitat. However, it must be borne in mind that gradually damaging activities can take time to show their effects. If evidence later shows an activity to be undermining the achievement of the conservation objectives, then the red-throated diver population will be deemed to be in unfavourable condition.

<sup>18</sup> Favourable condition relates to the maintenance of the structure, function, and typical species for that feature within the site.

<sup>19</sup> JNCC and Natural England (2013): *Draft Advice under Regulation 35(3) of The Conservation of Habitats and Species Regulations 2010 (as amended) and Regulation 18 of The Offshore Marine Conservation (Natural Habitats, & c.) Regulations 2007 (as amended)*.

Furthermore, the Supplementary Advice on Conservation Objectives for the Outer Thames Estuary SPA<sup>20</sup> notes a range of attributes which are considered to describe the site's ecological integrity. One of the attributes for the red-throated diver feature is "Disturbance caused by human activity". The target associated with this attribute is to "Reduce the frequency, duration and/ or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed". It is necessary to consider the significance of disturbance to red-throated diver resulting from the Project in this context.

Significant disturbance is defined<sup>21</sup> as where an action impacts on birds in such a way as to cause impacts on populations of a species through either;

- i. Changed local distribution on a continuing basis; and/or
- ii. Changed local abundance on a sustained basis; and/ or
- iii. The reduction of ability of any significant group of birds to survive, breed or rear their young.

Up to two offshore export cables from the Project are planned to run through the Outer Thames Estuary SPA. The offshore cable corridor passes through approximately 25 km of the SPA where the cable corridor width is between 2 km and 4 km, giving a total potential overlap between the export cable corridor and the SPA of approximately 132 km<sup>2</sup>. Cable-laying operations, utilising up to two vessels, have the potential to displace red-throated divers from an area around each vessel. The turbine array will be approximately 2 km from the SPA boundary at the nearest point (Figure 3).

<sup>20</sup>

<https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9020309&SiteName=outer+thames&SiteNameDisplay=Outer+Thames+Estuary+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=3>

<sup>21</sup> The Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) (2016): *Resolution 6.7 - Adoption of Guidance in the Context of Implementation of the AEWA Action Plan*.

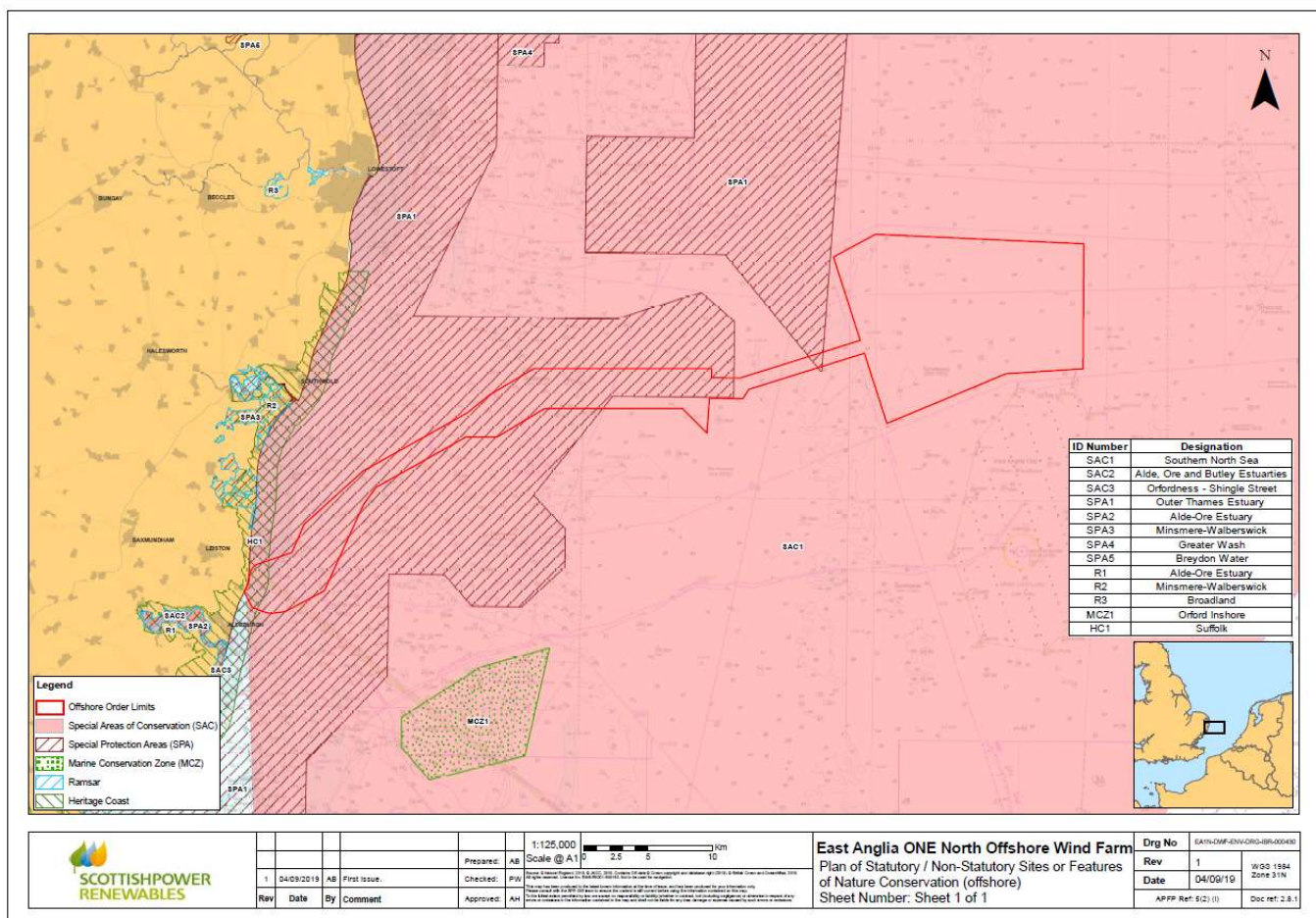


Figure 3. Location of the Project in relation to the Outer Thames Estuary SPA

LSEs on red-throated diver were identified from:

- Collision mortality (operation)
- Barrier effects (all project phases)
- Disturbance and displacement from offshore cable laying activities (construction)
- Displacement/disturbance from vessel traffic associated with site maintenance (operation)
- Displacement/disturbance from presence and operation of the turbines (construction and operation)

The Applicant submitted a Best Practice Protocol (BPP) to reduce disturbance and displacement of red-throated divers from vessels and helicopter movements during construction and operation [REP8-036]. The BPP will form part of the Project Environmental Management Plan (PEMP) to be approved by the Marine Management Organisation (MMO) and secured under condition 17 of the Generation Deemed Marine Licence (DML) and condition 13 of the Transmission DML [REP8-036]. The measures presented in the BPP were considered when assessing the impacts of the Project.

### 5.3.1. Non-breeding red-throated diver barrier effects and collision mortality: Alone or in combination

The Applicant and Natural England agreed that an adverse effect on the integrity of the site could be excluded in relation to barrier effects and collision mortality to from the Project alone or in combination with other projects [APP-043 and APP-046]. These conclusions are based on studies that indicate that the additional distances travelled by birds avoiding windfarms whilst on migration are negligible compared



to the total migration distances<sup>22</sup>. Furthermore, red-throated divers generally fly very low, and collision risks for migrating birds are predicted to be below one individual per year.

The Secretary of State is satisfied that an adverse effect on the integrity of the site from barrier effects and collision mortality to red-throated diver can be excluded for the Project alone and in combination with other projects.

### **5.3.2. Non-breeding red-throated diver displacement and/or disturbance: Alone**

#### **Disturbance and displacement from offshore cable laying activities (construction)**

Natural England agreed with the Applicant's conclusion that there was likely to be no adverse effect on integrity from offshore cable laying from Project alone, given the temporary nature of these activities. The ExA was also content that that an adverse effect on integrity could be excluded on the Outer Thames Estuary SPA due to disturbance and displacement effects on the red-throated diver feature arising from offshore cable laying activities.

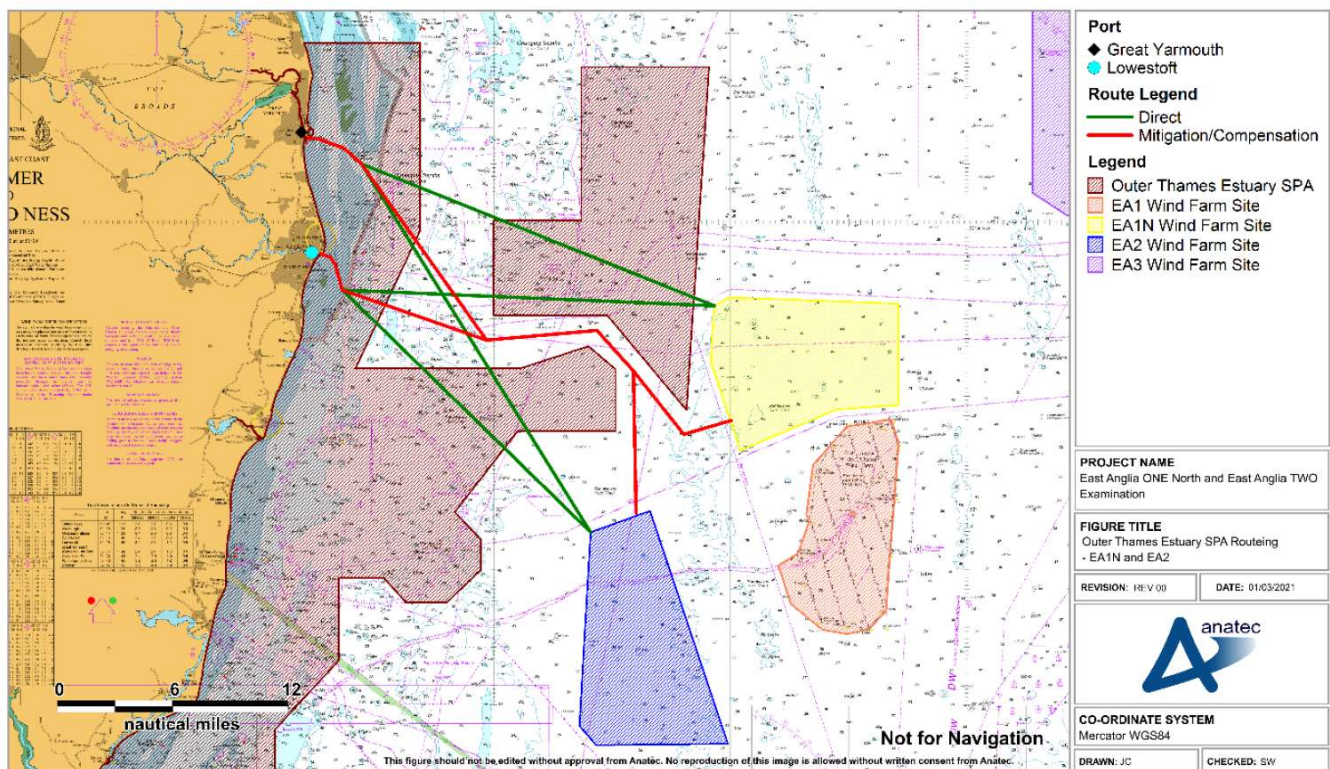
#### **Disturbance and displacement from vessel traffic associated with site maintenance (operation)**

During the Examination the Applicant agreed a BPP to minimise the disturbance impacts on red-throated divers. The BPP included the following measures:

- The main component of the SPA coincides with the approaches to Great Yarmouth and Lowestoft ports. When transiting this part of the SPA, vessels will use existing navigation routes where the densities of red-throated diver are relatively low.
- Once beyond the main components of the SPA, vessel traffic the ports will be routed through the gap between the main component and northern component of the SPA. This gap generally allows for a 4km width, although in places this is reduced to between 2.75 km and 3.30 km.
- All vessels associated with the Project will use an automatic identification system (AIS) which broadcasts the location of the vessel and is monitored by the Projects' Marine Co-ordination Centre.

The Applicant committed to implementing these measures for all project vessels between 1<sup>st</sup> November to 1<sup>st</sup> March inclusive, throughout the construction and operation of the Project, except for the installation and maintenance of the export cables which pass through the SPA; and emergencies and reasons of health and safety.

<sup>22</sup> Masden, E.A., Haydon, D.T., Fox, A.D., Furness, R.W., Bullman, R. and Desholm, M. (2009): *Barriers to Movement: Impacts of Wind Farms on Migrating Birds*. ICES Journal of Marine Science, 66, 746-753.



**Figure 4: Proposed Re-Routing of Vessels Associated with East Anglia One North and East Anglia Two OWFs**

Additionally, some or all of the following best practice measures, will be included in the PEMP [REP3-074] in agreement with the MMO and Natural England, and would apply to some of the instances:

- Avoid and minimise vessel traffic, where possible, during the most sensitive time period for red-throated diver between November and March 1st inclusive.
- Restrict vessel movements where possible to existing navigation routes (where the densities of divers are typically relatively low).
- Where it is necessary to go outside of established navigational routes, avoid rafting birds either en-route to the windfarm sites from port and/or within the windfarm sites (dependent on location) and where possible avoid disturbance to areas with consistently high diver density.
- Avoid over-revving of engines (to minimise noise disturbance).
- Briefing of vessel crew on the purpose and implications of these vessel management practices (through, for example, tool-box talks).

Natural England confirmed that it was satisfied that the BPP provided appropriate best practice to mitigate disturbance from vessels transiting the SPA [REP9-063], but also advised that the Project should as a minimum be avoiding and minimising vessel movements within the SPA in the period from 1st November to 31st March inclusive, as these are the key months when divers are present in the greatest numbers<sup>112</sup>.

The ExA was content that that an adverse effect on the integrity of the site due to disturbance and displacement effects on red-throated diver arising from offshore cable laying activities (construction) and vessel traffic associated with site maintenance (operation) can be excluded from the Project alone. The Secretary of State agrees with the ExA and considers that if vessel traffic management measures are implemented between 1<sup>st</sup> November and 31<sup>st</sup> March as recommended by Natural England, that an adverse effect on the integrity of the SPA from disturbance and displacement effects on red-throated divers from vessel and helicopter movements can be excluded. These measures will be secured in the DCO.

### **Disturbance and displacement from presence and operation of the turbines (construction and operation)**

The turbine array would be located 2 km from the Outer Thames Estuary SPA boundary at its nearest point [APP-043]. Natural England advised that the Outer Thames Estuary SPA is already impacted by offshore wind farms, and that the ecological consequences of the Project must, as a minimum, be neutral to avoid further hindrance of the conservation objectives [REP6-116]. Natural England stated that the 'buffer' between the Project and the SPA must be at least 10km to avoid undermining the conservation objectives of the site, and for any smaller buffer it would not be possible to exclude an adverse effect on the integrity of the site [REP6-116].

The Applicant's revised assessment of the displacement of red-throated divers in the Outer Thames Estuary [REP5-025, REP8-033, REP6-019, REP11-026] considered the conclusions of the London Array OWF Year 3 Ornithological Monitoring Report [REP 11-122] and presented both Natural England's preferred approach (using 100% displacement in the wind farm, in increments to 0% at 12 km based upon its interpretation of the London Array monitoring results) alongside the Applicant's own model. The Applicant stated that at a distance of 2km from the SPA, the Project alone would result in the displacement of 34.3 birds within the SPA, which is 0.2% of the population. Using a mortality rate of 10% (as advised by Natural England), the predicted mortality from displacement would be 3 birds per year, from a population of approximately 20,000 individuals [Rep11-026].

With respect to the distribution of the qualifying features within the SPA, Natural England advised the Applicant [REP1-172], that areas of the Outer Thames Estuary SPA within 10km of windfarms would be subject to some degree of displacement. With respect to East Anglia ONE North this equates to 2.8% of the SPA by area (c. 106 km<sup>2</sup>). However, the Applicant stated that the magnitude of displacement within the area of the disturbance effect also needed to be considered. Adjusting the SPA overlap area within each buffer (from 2km to 9km) by the respective displacement percentage provides the effective area of the SPA subject to displacement, which is 0.4-0.5% of the SPA [REP11-025] (c. 15 km<sup>2</sup>- 19 km<sup>2</sup>).

Natural England referenced the Supplementary Advice on Conservation Objectives for the Outer Thames Estuary SPA<sup>20</sup> that contains both a target to maintain red-throated diver numbers at or above current levels, and a target to reduce the disturbance of red-throated divers in its legal submission [REP4-089]. In its Comments on Legal Submissions [REP7-070], Natural England set out its view that should red-throated divers be denied access to part of the SPA (due to disturbance and displacement effects associated with the construction and operation of the Project) that would otherwise provide suitable habitat, the effect would be to diminish the functional size of the SPA, which is contrary to the site's conservation objectives.

Natural England accepted that there is unlikely to be a detectable effect on the red-throated diver population of the SPA [REP4-087]; however, a change in their distribution within the SPA was incompatible with meeting the conservation objective to maintain diver distribution and that this would constitute an adverse effect on the integrity of the SPA.

The ExA considered that uncertainty remained as to whether an adverse effect on the integrity of the Outer Thames Estuary SPA could be excluded from the Project alone as a result of disturbance and displacement effects on red-throated diver due to the presence and operation of the turbines.

Natural England wrote to the Secretary of State on 31st January 2022 to confirm that their advice was that the displacement effects would not be reduced to a negligible level until the array is moved at least 10km from the SPA.

The Secretary of State considers that, at a distance of 2km from the SPA, the disturbance and displacement effects of the turbines from the Project alone would undermine the conservation objectives

to maintain the distribution of red-throated divers within the SPA and therefore an adverse effect on the integrity of the Outer Thames Estuary SPA cannot be excluded.

### **5.3.3. Non-breeding red-throated diver displacement and/or disturbance: In-combination**

#### **Disturbance and displacement from offshore cable laying activities (construction)**

Natural England considered that the worst-case scenario assessed for cable laying activities during construction could result in an in-combination effect on the Outer Thames Estuary SPA because of disturbance to the red-throated diver feature. Natural England recommended that a seasonal restriction to cable laying activity be put in place to mitigate for this contribution. The Applicant reasoned that a seasonal restriction in cable installation would not be feasible or appropriate, but at [REP9-017] stated that within the BPP it had committed to re-routeing other construction vessel traffic between the construction port and the windfarm site to avoid as much of the SPA as is possible during the core winter months, which are 1 November to 1 March, inclusive.

The ExA acknowledged Natural England's concerns that the BPP provides no specific means of providing mitigation for the in-combination effects of cable laying: however, any potential displacement and disturbance effects on red-throated divers arising from cable laying activities would be short-term and temporary in nature. Furthermore, mitigation measures, as outlined in the BPP [REP3-074] would include a restriction on vessel movements during the period that red-throated divers are active and restrict vessel movements to areas of the SPA where the densities of red-throated divers are relatively low. The ExA considered that these measures would reduce the impacts of construction activities on red-throated divers to a level such that an adverse effect on the integrity of the SPA would not arise.

#### **Disturbance and displacement from vessel traffic associated with site maintenance (operation)**

The Applicant committed to a BPP to minimise disturbance to red-throated divers from vessels, and Natural England confirmed that it was satisfied that the BPP provided appropriate best practice to mitigate disturbance from vessels transiting the SPA [REP9-063].

The ExA was content that that an adverse effect on the red-throated diver feature of the SPA from disturbance and displacement effects arising from vessel traffic associated with site maintenance (operation) can be ruled out in-combination with other projects.

The Secretary of State is content that that an adverse effect on the integrity of the SPA from disturbance and displacement of red-throated divers arising from offshore cable laying activities (construction) and from vessel traffic associated with site maintenance (operation) can be ruled out in-combination with other projects

#### **Disturbance and displacement from presence and operation of the turbines (construction and operation)**

In respect of the in-combination effects of the presence and operation of turbines, the Applicant predicted an in-combination total of 1,433 individuals were at risk of displacement which, at 10% mortality, would result in an in-combination total of 143 mortalities. This equates to 0.7% of the current Outer Thames Estuary SPA population. However, as discussed in [REP5-025], the Applicant maintained that a mortality rate of 1% was more realistic and precautionary for this species, which would result in less than 0.1% of the population being at risk of in-combination displacement mortality, or 0.3 birds.

Natural England maintained concerns [REP9-067] that there is already an adverse effect on the integrity of the SPA from the displacement of red-throated divers from existing wind farms, and between 31%



(based on the Applicant's modelling outputs) and 47% of the Outer Thames Estuary SPA (assuming that the extent of displacement extends to 10km) is already affected.

Natural England advised that the 'buffer' between the Project and the SPA must be at least 10 km to avoid undermining the conservation objectives of the site and, at any distance less than this, it would not be possible to exclude an adverse effect on the integrity of the site alone or in-combination with other projects [REP6-116]. This position was supported by the RSPB [REP8-105].

The ExA concluded that an adverse effect on the integrity of the SPA cannot be excluded due to in-combination disturbance and displacement effects on red-throated divers arising from the presence and operation of the turbines.

The Secretary of State agrees with the advice of Natural England and the recommendation of the ExA and considers that an adverse effect on the integrity of the SPA cannot be excluded for the disturbance and displacement effects on red-throated diver arising from the presence and operation of turbines from the Project at a distance of 2km from the SPA, in-combination with other offshore wind farms.

### 5.4. Appropriate Assessment: Sandlings SPA

The Sandlings SPA lies near the Suffolk coast and covers an area of 3,391.80 ha. Lack of traditional management has resulted in the remnant areas of heath being subject to successional changes, with the consequent spread of bracken, shrubs, and trees.

The heaths support both acid grassland and heather-dominated plant communities, with dependent invertebrate and bird communities of conservation value. Woodlark and nightjar breed in the large conifer forest blocks on the site, using areas that have recently been felled and young plantations, as well as areas managed as open ground<sup>23</sup>. The onshore cable corridor is not yet fully defined, but will run alongside and potentially through the Sandlings SPA.

The Sandling qualifies as an SPA by supporting European important populations of the following Annex 1 species during the breeding season: nightjar, 109 pairs representing at least 3.2% of the breeding population in Great Britain (1992 count); and woodlark, 154 pairs representing at least 10.3% of the breeding population in Great Britain (1997 count).

The onshore ornithology study area was based on the onshore Project footprint and a 400 m buffer. This represents the uppermost spatial extent of potential disturbance-displacement impacts around nest sites associated with any ornithological feature likely to be present. The main pressures on the SPA are inappropriate scrub control, deer, air pollution and public access/ disturbance.

#### 5.4.1. Habitat loss: Alone

##### 5.4.1.1. Nightjar

Baseline surveys, undertaken in 2018, recorded six nightjar territories in areas of dry heath within the SPA. Two territory centres in the SPA were within 200 m of the onshore development area. Based on historic RSPB data, this is likely to be the maximum in any year [APP-043].

The 2018, survey also identified two territories within 500 m of the onshore development area and a further two within 750 m. There is potential for the foraging ranges of these birds to overlap with the

<sup>23</sup> <http://publications.naturalengland.org.uk/publication/6690828793675776>

Project area, based on a mean maximum foraging range of 747 m<sup>24</sup>. The results of the Extended Phase 1 Habitat Survey showed that there is no suitable nightjar habitat within the Project area, apart from a small amount of scrub where it overlaps with the northernmost part of the Sandlings SPA. The Project design has minimised the overlap of the onshore cable route with the SPA by crossing it at the narrowest point [APP-043].

Where the onshore cable corridor crosses the SPA, an open-cut crossing technique is the Applicant's preferred methodology. The Applicant has committed to an onshore cable route working width of 16.1 m within the Sandlings SPA for a length of up to 300 m, depending on the final detailed design. This would be micro-sited to minimise impacts on SPA qualifying features. It is estimated that the works to cross the SPA will take one month. The Applicant has further committed to conducting the crossing outside of the breeding season, which is mid-February to August inclusive. This will be confirmed in the Ecological Management Plan (EMP) which will be finalised post-consent in consultation with Natural England.

If Horizontal Directional Drilling (HDD) is used, the Applicant has also committed to carrying out crossing outside of the bird breeding season where HDD entry or exit pits are located within the SPA crossing buffer. Boring operations would be completed within approximately six months and the HDD entrance and exit pit, and temporary working areas would be situated outside of the SPA. To comply with seasonal restrictions associated with crossing the SPA, the HDD works may take over two years.

Following construction, all habitats along the onshore cable corridor will be fully re-instated. During operation, the onshore substation and National Grid infrastructure will be present; however, as they will be located in habitat unsuitable for nightjar, and over 2 km from the SPA. The Applicant concluded that there would be no impacts on nightjar during operation [APP-043].

The Applicant concluded that as no nightjars have previously been recorded within the area of the SPA where open-cut trenching would be located, and with consideration of the embedded mitigation measures for the crossing, it is unlikely any suitable nightjar habitat for foraging or roosting would be lost.

The SoCG between the Applicant and Natural England states that there was an agreement that there would be no adverse effect on the integrity of Sandlings SPA from the crossing of the onshore cable construction, subject to mitigation as contained in the Outline SPA Crossing Method Statement, CoCP, and OLEMS.

The Secretary of State concludes that an adverse effect on the integrity of the SPA from impacts on nightjar from the Project alone can be excluded.

### 5.4.1.2. Woodlark

Approximately six woodlark territories were located within suitable heath, scrub and forestry habitat within the SPA in 2018. Of these, three may overlap with the Project site. Data provided by the RSPB showed that historic distribution was similar to that recorded in 2018, and woodlark numbers have been reasonably stable since 2012.

The Extended Phase 1 Habitat survey showed that there is a lack of suitable habitat surrounding the SPA, with land comprising improved grassland and arable fields with only small, isolated patches of scrub and woodland. Woodlarks are therefore likely to remain largely within the SPA when breeding.

As outlined in Section 5.4.1.1 of the ExA report, open cut trench methodology is the Applicant's preferred method of crossing the SPA. Some habitats within the northern part of the SPA would be lost during construction should open-cut trenching be carried out. However, the 2018 baseline survey data and historic RSPB data since 2008 show that woodlarks were not recorded in this part of the SPA, and the

<sup>24</sup> Sharps, K., Henderson, I., Conway, G., Armour-Chelu, N., and Dolman, P.L. (2015) *Home-Range Size and Habitat Use of European Nightjars *Caprimulgus europaeus* Nesting in a Complex Plantation-Forest Landscape*. Ibis (2015), 157, 260–272.

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habitat is mainly comprised of dense scrub which is less suited to woodlarks. It is therefore unlikely to be used by breeding woodlark.

The two territories identified in 2018 which may partially overlap the Project area were located beside the area allocated for turtle dove mitigation rather than construction activities. Therefore, no habitat would be lost.

All habitats along the onshore cable corridor will be fully reinstated. The onshore substation and National Grid infrastructure present will be located in habitat unsuitable for woodlark and over 2 km from the SPA, and there will be no permanent SPA habitat loss. The Applicant concluded that there will be no impacts on woodlark during operation [APP-043].

The Applicant considered it unlikely that any habitat for nesting or foraging woodlark would be lost due to construction or infrastructure associated with the Project and the temporary loss of habitat within the SPA.

Natural England have agreed with the conclusions of the in-combination assessment [REP8-108]. The ExA is satisfied that no adverse effects on the integrity of the Sandlings SPA will result in-combination with the other projects assessed.

The Secretary of State concludes that an adverse effect on the integrity of the Sandlings SPA from impacts on woodlark from the Project alone can be excluded.

### **5.4.1.3. Conclusions for all qualifying features**

Both Natural England [RR-059] and Save Our Sandlings [REP3-122] put forward their preference for HDD methodologies to avoid habitat loss. The Applicant stated that habitat loss impacts using an open cut method would be minimised by crossing the SPA at its narrowest point and reducing the onshore cable route working width to 16.1 m [AS-036]. This working width is secured by Requirement 12 in the dDCO. The Applicant held its position in its submitted Outline SPA Crossing Method Statement [REP1-043]. Natural England responded to this document stating concern that open cut methods would divide the SPA and it was not content to rule out an adverse effect on the integrity of the SPA [REP2-053]. The Applicant confirmed that there would be no loss of functioning habitat for SPA qualifying features based on their known distributions [REP3-070].

Natural England also requested information on the proposed habitat reinstatement and enhancement at the SPA crossing; its function; timeframe and monitoring; advising that enhancement should go beyond the proposed five years post-cable installation identified by the Applicant [REP2-053, REP4-092]. The Outline Landscape and Ecological Management Strategy (OLEMS) was subsequently updated during Examination to incorporate comments from IPs [REP3-030].

Natural England welcomed the commitment to consultation, monitoring and mitigation outlined in the updated Outline SPA Crossing Method Statement and OLEMS, stating that an adverse effect on the integrity of Sandlings SPA was unlikely to occur from an open cut trench crossing subject to these measures being implemented [REP8-162]. The RSPB agreed with this conclusion [REP8-104].

The Secretary of State concludes that an adverse effect on the integrity of the Sandlings SPA from impacts on qualifying features from the Project alone can be excluded.

## **5.4.2. Habitat loss: In-combination**

### **5.4.2.1. Nightjar and woodlark**

Three planned projects were identified within a potential zone of influence for nightjar and woodlark: the proposed East Anglia Two offshore wind farm (EA2); the proposed Sizewell C Nuclear Power Station; and the proposed Sizewell B Power Station Complex and adjoining land.

The proposed EA2 and the Project share the same landfall location and onshore cable corridor. The two onshore substations are also co-located and connect to the same National Grid substation. The in-

combination assessment considered the worst-case scenario which is that the Project and the proposed EA2 project are built sequentially.

During Examination, the Applicant provided a project update [REP2-007] which committed to parallel cable duct installation for both the Project and EA2, should the projects be consented and constructed sequentially. This would mean the onshore construction effects of the Project alone would be largely similar to those in-combination with EA2.

The results from baseline surveys show that the onshore cable corridor, which is shared by EA2, has little suitable habitat for nightjar. Where the cable route crosses the SPA, there are no records of nightjar using this area since at least 2009, and woodlark since at least 2008, and the habitat is unlikely to be of importance to either species. If HDD techniques were used, no SPA habitat, or suitable foraging habitat outside of the SPA, would be lost during construction. As habitat will be reinstated there will be no permanent habitat loss during operation.

The main development site for Sizewell C Nuclear Power Station would be located approximately 1.3 km from the onshore Project area, and 1.6 km from the Sandlings SPA. The Sizewell B Power Station Complex comprises the relocation and consolidation of nineteen of the existing Sizewell B Power Station Complex facilities. The closest part of the developments to the SPA is an outage car park approximately 650 m to the east.

According to the Sizewell C Preliminary Environmental Information Report (PEIR), there was no evidence which suggested that nightjar or woodlark are breeding within the Sizewell C New Nuclear Power Station study area. Land adjacent to the SPA where the closest infrastructure would be located is comprised of unsuitable agricultural habitat. As there will be no habitat loss associated with the operational phase of the Project, no in-combination operational impacts were predicted.

The Statement of common ground between the Applicant and the RSPB states that the conclusions of the in-combination assessment for habitat loss are agreed [REP8-104], noting that there will be a need to revisit interaction with other projects if changes are made to the timescales of the Project. Natural England also agreed with the conclusions of the in-combination assessment for habitat loss [REP8-109].

The Secretary of State concludes that an adverse effect on the integrity of the Sandlings SPA from the impacts of habitat loss on qualifying species from the Project in combination with other projects can be excluded.

### 5.4.3. Displacement and/or disturbance: Alone

Due to the increased duration of construction activities, it is considered that construction Scenario 2 (the Project and the proposed EA2 project are built sequentially) would have greater potential for an unmitigated in-combination effect. Under this scenario, nightjar and woodlark could be affected for two breeding seasons.

#### 5.4.3.1. Nightjar

Literature indicates an active disturbance upper limit of <10 m for nesting nightjar during incubation and 50 – 100 m during chick rearing<sup>25</sup>. Murison<sup>26</sup> found a significant negative impact on nightjar density within 500 m of a path, which suggests failures could be linked to predation by corvids and dogs in conjunction with human disturbance. A safe working distance during forestry operations from nest sites has been

<sup>25</sup> Ruddock, M. & Whitfield, D. P. (2007) *A Review of Disturbance Distances in Selected Bird Species*. A Report from Natural Research (Projects) Ltd to Scottish Natural Heritage.

<sup>26</sup> Murison, G. 2002. *The Impact of Human Disturbance on the Breeding Success of Nightjar Caprimulgus europaeus on Heathlands in South Dorset, England*. English Nature Research Report no. 483. Peterborough: English Nature.



advocated of 50 – 200 m<sup>27</sup>. However, monitoring of nightjar over a three-year construction period at the Pen y Cymoedd Wind Farm in Wales found no significant difference detected between chick numbers or nest success at nests within or outside 200 m disturbance buffers<sup>28</sup>.

Any disturbance impacts within the onshore development area beyond a 200 m buffer from a nest would likely be related to increased access for predators, dogs or humans, rather than noise or visual disturbance associated with construction activities within the landfall area. The level of access surrounding the SPA is not anticipated to change due to construction of the Project, which suggests there will be no additional adverse disturbance impacts occurring beyond 200 m from a disturbance source.

Two territories were recorded within 200 m of the onshore development area in the Sandlings SPA in 2018. As one of these is in proximity to the area for turtle dove mitigation, the risk of construction related disturbance within this territory is low.

The likelihood and extent of the other territory within proximity to the SPA crossing area being affected is dependent on the seasonal and spatial restrictions placed on the crossing methodology. The seasonal and spatial restrictions associated with the SPA crossing mean the assessment considered it unlikely that any nesting nightjars would be subject to disturbance during the construction period. Works along the remainder of the onshore cable corridor, which would be beyond 200 m from the SPA crossing, could take place during the breeding season. However, it is considered unlikely that any breeding nightjars would be disturbed by this as it would be beyond 200 m from any probable nest site locations and in unfavourable foraging habitat.

The Applicant outlined the following mitigation measures which may be employed during construction works within 200 m of the SPA boundary during the breeding bird season:

- A Breeding Bird Protection Plan (BBPP) highlighting risks to breeding birds and detailing measures to ensure nest protection;
- Pre- and during construction bird surveys to establish presence of breeding birds;
- Measures adopted to minimise noise, light and disturbance on identified breeding birds;
- Construction activities monitored by an Ecological Clerk of Works (ECOW) or suitably qualified ornithologist; and
- Where breeding bird activity within the SPA is recorded within 200 m of construction works, such works would be halted immediately until a disturbance risk assessment is undertaken by a suitably qualified ecologist.

Routine maintenance is not anticipated for the onshore cable route and emergency repairs are expected to be short-term in duration and infrequent. Temporary task lighting may be used in areas where maintenance and repair activities are taking place, but as this would likely be over 200 m from the nearest territories within the SPA, the Applicant did not anticipate any impacts on nightjar. Operational lighting will be required for maintenance activities at the onshore substation and National Grid substation only, and the substations would not be permanently lit. An Artificial Light Emissions Management Plan will be developed for the final design for the permanent infrastructure, as secured under the dDCO, which will include measures to minimise light spill. As the infrastructure will be over 2 km from the SPA, no nightjars will be affected by this.

### 5.4.3.2. Woodlark

The HRAR presented evidence that neither woodlark nest success nor productivity of successful nests were affected by recreational activity [APP-043]. The activities associated with construction of the Project

<sup>27</sup> Currie, F. & Elliott, G. (1997): *Forests and Birds: A Guide to Managing Forests for Rare Birds*. Forestry Authority, Cambridge and Royal Society for the Protection of Birds, Sandy, UK.

<sup>28</sup> Shewring, M. & Carrington, D. (2017): *Evidence of Nightjar Disturbance Distances during Construction Works at an Upland Wind Farm Site*. Natural Power Poster presentation.

were considered likely to be more predictable and less intrusive than recreational activities and would take place in a clearly defined zone outside of the SPA.

Of the three territories identified in the 2018 survey, one was within 200 m of the northernmost part of the SPA where crossing of the cable corridor is required. The likelihood and extent of this territory being affected would depend on the seasonal and spatial restrictions of open-cut trenching or HDD crossing techniques. Furthermore, works for the crossing techniques would take place outside of the bird breeding season, and open cut trenching would be in habitat unsuitable for nesting woodlark.

Construction activities may take place outside of the area of seasonal crossing restrictions during the breeding season. However, as the other two territories potentially overlapping with the onshore development area are located next to the area for turtle dove mitigation, which would be free of cable installation infrastructure, the assessment considered it unlikely that these territories would be affected by construction disturbance, which would occur over 200 m from any nest sites. The mitigation measures outlined in Section 5.4.3.1 for nightjar are also applicable to woodlark.

Furthermore, the operational impacts from the Project are expected to be non-routine, infrequent and short in their duration. An Artificial Light Emissions Management Plan will be developed for the final design of the Project to minimise light spill.

### **5.4.3.3. Conclusions for all qualifying features**

Natural England requested seasonal restrictions on the SPA crossing to be secured in the dDCO and Code of Construction Practice (CoCP) [RR-059]. In response, the Applicant stated in the Outline SPA Crossing Method Statement [REP1-043] that no construction works associated with the SPA crossing, if undertaken by open cut trenching, will be carried out within the SPA or 200 m buffer during nightjar and/or woodlark breeding season, unless otherwise agreed with the Local Planning Authority (LPA) and Natural England. The Applicant stated that the seasonal restriction would not apply if the crossing was undertaken by HDD [REP3-084]. The Applicant updated the OLEMS to reflect this commitment [REP3-030], which sets out the content of the EMP and BBPP. The Applicant considered that these measures were sufficiently secured by Requirement 21 of the DCO as Natural England is named as a statutory consultee on the EMP [APP-023]. Natural England acknowledged that the updated OLEMS provided additional clarity.

ESC sought clarification on the need for intrusive pre-construction surveys within the SPA [REP7-063]. The Applicant responded that the Outline SPA Crossing Method Statement confirms that no pre-construction surveys will be carried out within the SPA crossing area during the nightjar or woodlark breeding season, and pre-construction surveys would be subject to approval by the relevant planning authority under the EMP secured in the dDCO [REP8-048].

The Statement of Common Ground between the Applicant and the RSPB states that the outcomes of the HRAR are agreed subject to the agreement of the SPA Crossing Method Statement and the proposed mitigation being secured [REP8-104]. The Statement of Common Ground between the Applicant and Natural England [REP8-108] states agreement that there would be no adverse effects on the integrity of Sandlings SPA, subject to mitigation as contained in the Outline SPA Crossing Method Statement, CoCP and OLEMS.

The Secretary of State concludes that an adverse effect on the integrity of the Sandlings SPA from disturbance and/ or displacement from the Project alone can be excluded.

### **5.4.4. Displacement and/or disturbance: In-combination**

#### **5.4.4.1. Nightjar and woodlark**

Due to the increased duration of construction activities, it is considered that construction Scenario 2 (the Project and the proposed EA2 project are built sequentially) would have greater potential for an unmitigated in-combination effect. Under this scenario, nightjar and woodlark could be affected for two breeding seasons.

Embedded mitigation measures in the vicinity of the SPA for both the Project and EA2 would reduce the likelihood of disturbance from construction activities. Under this scenario, both projects would be subject to breeding season restrictions on the SPA crossing technique employed. As previously outlined, construction activities within the onshore development area which may take place during the breeding season will be conducted beyond 200 m from the SPA crossing section, and in an area of habitat which is of low suitability for breeding nightjar. The two woodlark territories identified within 200 m of the onshore development area are located in proximity to the turtle dove mitigation area and over 200 m from any infrastructure, therefore disturbance is unlikely. The assessment considered it to be very unlikely that there would be any unmitigated adverse effects associated with the operational phase of the Project, which would also be true of EA2.

Several mitigation measures have been explored for Sizewell C Nuclear Power Station, including the maintenance of habitat corridors, the management of public access to sensitive sites (including the SPA), and the inclusion of environmental buffers and acoustic fencing to help protect neighbouring habitats and species from light, noise and visual disturbance. The closest nightjar and woodlark territories are likely to be outside of foraging ranges from the proposed Sizewell B Power Station Complex and Sizewell C Nuclear Power Station projects. No in-combination operational impacts were predicted from the proposed developments. Natural England agreed with the conclusions of the in-combination assessment [REP-108].

The Secretary of State concludes that an adverse effect on the integrity of the SPA from displacement and/ or disturbance from the Project in combination with other projects can be excluded.

### *5.4.4.2. Indirect effects on supporting habitat*

The Applicant provided an Outline Watercourse Crossing Method Statement (OWCMS). The submitted document presented an assessment of two alternative methods of crossing the Hundred River (dry and flume pipe techniques) [REP3-048]. Appendix 4 of the OWCMS explained that trenchless techniques were not considered viable due to the number of constraints, including lack of lateral space, the need for longer duration of works, and the requirement for specific plant and equipment to undertake the works.

The Statement of Common Ground between the Applicant and Natural England agreed that an adverse effect on the integrity of the SPA is unlikely to arise from downstream impacts from the Hundred River crossing, subject to control measures in the final Watercourse Crossing Method Statement (WCMS) [REP11-074]. The final crossing methodology will be decided post-consent in agreement with the LPA through a WCMS secured within the CoCP by Requirement 22 of the dDCO. The ExA was satisfied that the final WCMS will secure the necessary measures to avoid downstream effects on the Sandlings SPA.

Following comments from Natural England on air quality, the Applicant updated its Onshore Ecology Clarification Note [REP3-060] and submitted an Air Quality Clarification note [REP3-061]. Natural England requested a full assessment of the resulting effects of changes in air quality during construction and decommissioning on the supporting habitats of the SPA [REP4-092].

Discussions on the potential impacts of emissions from non-road mobile machinery (NRMM) at the onshore cable landfall area took place throughout the Examination. East Suffolk Council (ESC) confirmed it was satisfied with the commitments in place in relation to NRMM with respect to air emissions [REP11-110], but restated its preference for an open cut construction technique for crossing the SPA [REP8-114]. This preference was also due to air emission concerns. The Applicant provided an update to its Onshore Ecology Clarification Note [REP6-025] which further considered NRMM impacts on ecological receptors.

Natural England confirmed that it did not consider ammonia emissions from vehicles/machinery to represent a pathway for significant impacts to the SPA [REP1-123]. The Statement of Common Ground between the Applicant and Natural England [REP8-108] records agreement with the conclusions of the Applicant's HRA report during all phases of the Project. Natural England also advised that an adverse effect on the integrity of the SPA is unlikely to result from an open cut trench methodology [REP8-162].

The Secretary of State concludes that an adverse effect on the integrity of the Sandling SPA from indirect effects on supporting habitats from the Project in combination with other projects can be excluded.

### **5.5. Appropriate Assessment: Breydon Water SPA and Ramsar**

The Breydon Water SPA and Ramsar covers 1,203 ha and is an inland tidal estuary on the River Yare and its confluence with the Rivers Bure and Waveney, adjoining The Broads. The Project is approximately 44 km away at its closest point.

Breydon Water qualifies as an SPA by regularly supporting populations of the following Annex I species of European importance: breeding populations of common tern; and wintering Bewick's swan, pied avocet, European golden plover, northern lapwing, and ruff. The site also qualifies by supporting a wintering waterfowl assemblage of international importance.

Breydon Water Ramsar, which is coincident with the SPA, qualifies under Criterion 5 for waterfowl assemblages of international importance; and Criterion 6 for wintering species/ populations occurring at levels of international importance, including Bewick's swan and northern lapwing.

The Secretary of State has considered the potential for the Project to constitute an adverse effect on site integrity for each feature for which a significant effect is likely. The Secretary of State has identified a likely significant effect on the wintering waterfowl assemblage from the effects of the Project alone and in-combination with other plans or projects due to collision mortality during the operational phase of the Project.

#### **5.5.1. Collision Mortality: Alone**

Migrant collision risk modelling was undertaken for all the species with potential for connectivity to the Project on passage using the methods developed for the Strategic Ornithological Support Services (SOSS) programme. This assessment found that predicted collisions apportioned to this SPA and Ramsar were very small, with none exceeding 1 individual per year (East Anglia One North ES Appendix 12.2 Annex 8). These levels of additional mortality would not increase the background mortality rate by more than 1% and would therefore be undetectable against natural variations.

Neither Natural England, nor other IPs, raised any concerns in relation to the Applicant's conclusions for the Breydon Water SPA and Ramsar site and its qualifying features. In the SoCG for offshore ornithology between the Applicant and Natural England, the matter of operational impacts resulting from collision risk was stated as agreed [REP8-110]. The ExA concluded it was satisfied that an adverse effect on integrity can be ruled out for the Breydon Water SPA and Ramsar site and its qualifying features.

The Secretary of State therefore concludes that an adverse effect on the integrity of the Breydon Water SPA and Ramsar as a result of collision mortality to the wintering waterfowl assemblage from the Project alone can be excluded.

#### **5.5.1. Collision Mortality: In-combination**

In-combination collision mortality with the nearby Norfolk Vanguard, Norfolk Boreas, East Anglia Three and East Anglia Two projects were similarly very small (increases in background mortality rates remained less than 1%, (East Anglia One North ES Appendix 12.2 Annex 8).

Neither Natural England, nor other IPs, raised any concerns in relation to the Applicant's conclusions for the Breydon Water SPA and Ramsar site and its qualifying features. In the SoCG for offshore ornithology between the Applicant and Natural England, the matter of operational impacts resulting from collision risk was stated as agreed [REP8-110]. The ExA concluded it was satisfied that an adverse effect on integrity can be ruled out for the Breydon Water SPA and Ramsar site and its qualifying features.

The Secretary of State concludes that an adverse effect on the integrity of the Breydon Water SPA and Ramsar as a result of collision mortality to the wintering waterfowl assemblage from the Project in combination with other projects can be excluded.

### 5.6. Appropriate Assessment: Broadland SPA and Ramsar

Broadland is a low-lying wetland complex between east Norfolk and north Suffolk. The area is of international importance for a variety of wintering and breeding raptors and waterbirds associated with lowland marshes. The Project is approximately 39 km away at its closest point.

Broadland qualifies as an SPA by regularly supporting populations of the following Annex I species of European importance: whooper swan, bittern, marsh harrier, hen harrier, ruff, and non-breeding Bewick's swan. The site also qualifies for the regularly migrating non-Annex 1 species: gadwall, shoveler and wigeon.

Broadland Ramsar, which is coincident with the SPA, qualifies under Criterion 6 for the following species/populations of wintering birds occurring at levels of international importance: Bewick's swan, gadwall, shoveler and wigeon.

The Secretary of State has considered the potential for the Project to constitute an adverse effect on site integrity for each feature for which a significant effect is likely. The Secretary of State has identified a likely significant effect due to the potential for collision mortality on the wintering waterfowl assemblage from the Project alone or in combination during operation.

#### 5.6.1. Collision Mortality: Alone

Migrant collision risk modelling was undertaken for all the species with potential for connectivity to East Anglia One North on passage using the methods developed for the SoSS programme. This assessment found that predicted collisions apportioned to this SPA and Ramsar were very small, with none exceeding 1 individual per year (East Anglia One North ES Appendix 12.2 Annex 8). These levels of additional mortality would not increase the background mortality rate by more than 1% and would therefore be undetectable against natural variations.

Neither Natural England, nor other IPs, raised any concerns in relation to the Applicant's conclusions for the Broadland SPA and Ramsar site and its qualifying features. In the SoCG for offshore ornithology between the Applicant and Natural England, the matter of operational impacts resulting from collision risk was stated as agreed [REP8-110]. The ExA concluded it was satisfied that an adverse effect on integrity can be ruled out for the Broadland SPA and Ramsar site and its qualifying features.

The Secretary of State concludes that an adverse effect on the integrity of the Broadland SPA and Ramsar from collision mortality from the Project alone can be excluded.

#### 5.6.2. Collision Mortality: In-combination

In-combination collision mortality with the nearby Norfolk Vanguard, Norfolk Boreas, East Anglia Three and East Anglia Two projects were similarly very small (increases in background mortality rates remained less than 1%, (East Anglia One North ES Appendix 12.2 Annex 8).

Neither Natural England, nor other IPs, raised any concerns in relation to the Applicant's conclusions for the Broadland SPA and Ramsar site and its qualifying features. In the SoCG for offshore ornithology between the Applicant and Natural England, the matter of operational impacts resulting from collision risk was stated as agreed [REP8-110]. The ExA concluded it was satisfied that an adverse effect on integrity can be ruled out for the Broadland SPA and Ramsar site and its qualifying features.

The Secretary of State concludes that an adverse effect on the integrity of the Broadland SPA and Ramsar from collision mortality from the Project in combination with other projects can be excluded.



## 5.7. Appropriate Assessment: Greater Wash SPA

The Greater Wash SPA covers 353,578 ha and is located between Bridlington Bay, East Yorkshire and the area just north of Great Yarmouth on the Norfolk coast. The SPA has a landward boundary at Mean High Water and an offshore extent of around 30 km. The Project is approximately 39km away at its closest point.

The Greater Wash qualifies as an SPA under Article 4.1 of the Birds Directive (79/409/EEC) by regularly supporting populations of Annex I species of European importance: breeding populations of Sandwich tern, common tern and little tern; non-breeding red-throated diver and little gull; and the regularly occurring migratory species common scoter.

The Secretary of State has considered the potential for the Project to constitute an adverse effect on site integrity for each feature for which a significant effect is likely. A potential likely significant effect was identified for disturbance and displacement of red-throated diver during operation, and collision mortality of non-breeding little gull during operation, both alone and in-combination with other plans or projects.

### 5.7.1. Red-Throated Diver: Alone

Red-throated divers are sensitive to disturbance due to vessel movements, windfarm construction and windfarm operation. The Project (including the offshore cable corridor) is outside the Greater Wash SPA. The Project is also beyond the range at which any construction or operation activities could affect red-throated divers within the SPA, and the port that is likely to be used for operation and maintenance vessels is not within the SPA. Consequently, the potential effect could only impact on birds passing through the windfarm on migration to and from the SPA. This could include barrier effects and collision risk.

The additional distances travelled by birds avoiding windfarms whilst on migration (i.e., up to twice per year) are negligible when compared to the total migration distances (Masden *et al.* 2009). Therefore, the energetic costs of such barrier effects are also negligible. Red-throated divers fly very low to the water and consequently collision risks on migration are low (total annual collision prediction <1 individual; Appendix 12.2 Annex 4 of the ES).

Neither Natural England, nor other IPs, raised any concerns in relation to the Applicant's conclusion of no adverse effect on integrity for the red-throated diver feature of the SPA [REP1-058]. The ExA was satisfied with the conclusion of no adverse effect on the integrity of the red-throated diver feature of the Greater Wash SPA resulting from the Project alone.

The relevant conservation objective to red-throated diver in the Greater Wash SPA is the maintenance of numbers at a level similar to that at designation, subject to natural change. On this basis, the Secretary of State concludes that an adverse effect on the integrity of the Greater Wash SPA from the effects of red-throated diver disturbance and displacement from the Project alone can be excluded.

The Secretary of State concludes that an adverse effect on the integrity of the Greater Wash SPA from the effects of red-throated diver disturbance and displacement from the Project alone can be excluded.

### 5.7.2. Red-Throated Diver: In-combination

There is potential for offshore windfarms in the southern North Sea to present a combined barrier to movement of red-throated divers whilst on migration to and from the SPA. Global Positioning Systems (GPS) tracking of red-throated divers<sup>5</sup> indicate that individuals tend to migrate to the SPA area to the north or south of most of the windfarm sites (almost all of which are not currently constructed). It is thus very unlikely that the Project would contribute to an in-combination barrier or collision effect on the Greater Wash SPA red-throated diver population.

The relevant conservation objective is the maintenance of red-throated diver numbers within the Greater Wash SPA at a level similar to that at designation, subject to natural change.



The Applicant considered that the very low risk of effects to red-throated divers whilst on migration due to the Project means the potential for the Project to contribute to an in-combination effect on the red-throated diver population of the Greater Wash SPA is also considered to be negligible.

Neither Natural England, nor other IPs, raised any concerns in relation to the Applicant's conclusion of no adverse effect on integrity for the red-throated diver feature of the SPA [REP1-058]. The ExA was satisfied with the conclusion of no adverse effect on the integrity of the red-throated diver feature of the Greater Wash SPA resulting from the Project or in-combination with other plans or projects.

The Secretary of State concludes that an adverse effect on the integrity of the Greater Wash SPA from on the effects of red-throated diver disturbance and displacement from the Project in-combination with other projects can be excluded.

### 5.7.3. Little Gull: Alone

The population of little gull in the Greater Wash SPA in mid-winter was estimated at 1,255 (mean of peak counts in the winter period for 2004/05 and 2005/06); Stienen et al. (2007)<sup>29</sup> reported that the flyway population with potential connectivity to the southern North Sea was up to 75,000. However, the Applicant's assessment was based on the more precautionary population sizes of 10,000 to 20,000.

Little gulls tend to fly low over the water. The mean percentage of little gull flying at collision risk height (defined as above 22m) is 12.5%<sup>30</sup>. Based on this, the little gull collision mortality for the Project was a mean of 1.1 birds per year with 95% confidence intervals of 0.24 to 2.2 for seabird density derived from option 2 of the Band model.

Based on an adult survival rate of 0.8<sup>31</sup>, the natural annual mortality for little gull will be between 2,000 and 4,000 birds (for population sizes of 10,000 to 20,000). The estimated maximum proposed Project collision mortality of 1.1 birds represents an increase in mortality of between 0.03% to 0.06%. Following SNCB recommendations, an increase in mortality of less than 1% is considered to be undetectable against the range of background variation.

The Greater Wash SPA designated population of little gull is 1,255, which is 13% of a population of 10,000 or 6.5% of a population of 20,000. On this basis, and assuming collisions would be distributed uniformly throughout the population, this would imply that a maximum of 0.14 individuals from the Greater Wash SPA population of little gull could be killed by collisions (13% of 1.1), which would be even reduced further on the basis of the more realistic wider population (of 20,000).

There is very little consistent evidence regarding displacement of little gulls by offshore windfarms and the Applicant concluded that the displacement of little gulls by offshore windfarms would be negligible.

Neither Natural England, nor other IPs, raised any concerns in relation to the Applicant's conclusion of no adverse effect on integrity for the little gull feature of the SPA [REP1-058]. The ExA was satisfied with the conclusion of no adverse effect on integrity on the little gull feature of the Greater Wash SPA due to collision mortality resulting from the Project alone.

<sup>29</sup> Stienen, E.W.M., Waeyenberge, V., Kuijken, E. and Seys, J. (2007). *Trapped within the Corridor of the Southern North Sea: the Potential Impact of Offshore Wind Farms on Seabirds*.

<sup>30</sup> Johnston, A., Cook, A.S.C.P., Wright, L.J., Humphreys, E.M. and Burton, N.H.K. (2014). *Modelling Flight Heights of Marine Birds to More Accurately Assess Collision Risk with Offshore Wind Turbines* (vol 51, pg31, 2014) Corrigendum. *Journal of Applied Ecology*, 51, 1126-1130.

<sup>31</sup> Horswill, C. and Robinson, R.A. (2015) *Review of Seabird Demographic Rates and Density Dependence*. JNCC Report No. 552. Joint Nature Conservation Committee, Peterborough.

The Secretary of State concludes that an adverse effect on the integrity of the Greater Wash SPA from impacts on little gull from the Project alone can be excluded.

### **5.7.4. Little Gull: In-combination**

Given the extremely small potential effect on little gull from the Project alone, the Applicant concluded that the likelihood of the proposed Project contributing to an in-combination impact was extremely small; however, following advice from Natural England the predicted mortality at windfarms with potential connectivity to the Greater Wash SPA has been collated and assessed.

The predicted mortality of little gull from the Project in-combination with other windfarms was estimated to be 70. Given a regional little gull population of between 10,000 and 20,000 this figure (70) represents an increase in background mortality of between 1.7% and 3.5%.

The Greater Wash SPA designated population of little gull is 1,255, which is 12.6% of a population of 10,000 or 6.3% of a population of 20,000. On this basis, and assuming collisions would be distributed uniformly throughout the population, this would imply that a maximum of 8.8 individuals from the Greater Wash SPA population would be at risk of in-combination collisions, which is c.0.7% of the SPA population.

Neither Natural England, nor other IPs, raised any concerns in relation to the Applicant's conclusion of no adverse effect on integrity for the little gull feature of the SPA [REP1-058]. The ExA was satisfied with the conclusion of no adverse effect on integrity on the little gull feature of the Greater Wash SPA due to collision mortality resulting from the Project in-combination with other plans or projects.

The relevant conservation objective is the maintenance of little gull numbers within the Greater Wash SPA at a level similar to that at designation, subject to natural change. The Secretary of State concludes that an adverse effect on the integrity of the SPA from impacts on little gull from the Project in combination with other projects can be excluded.

## **5.8. Appropriate Assessment: North Norfolk Coast SPA and Ramsar**

The North Norfolk Coast SPA is a coastal site covering an area of approximately 78.87 km<sup>2</sup>. The site is situated along the northern coastline of Norfolk, between Holme and Weybourne and comprises a wide variety of coastal and intertidal habitats. The site is approximately 98 km from the site at its nearest point.

The North Norfolk Coast qualifies as an SPA under Article 4.1 of the Birds Directive (79/401/EEC) by regularly supporting populations of the following Annex II species of European importance: breeding populations of common tern, little tern, sandwich tern, pied avocet, marsh harrier and bittern; and wintering dark-bellied brent goose, pink-footed goose, pied avocet, red knot and wigeon. The site also qualifies under Article 4.2 of the Birds Directive by supporting a wintering waterfowl assemblage of international importance.

The North Norfolk Coast Ramsar, which is largely coincident with the SPA, qualifies under Criterion 5 for its internationally important assemblages of wintering waterfowl; and Criterion 6 for species/ populations of wintering birds occurring at levels of international importance; breeding common tern, sandwich tern and little tern; migrating red knot; and wintering pink-footed goose, dark-bellied brent goose, pintail and wigeon.

The Secretary of State has considered the potential for the Project to constitute an adverse effect on site integrity for each feature for which a significant effect is likely. The Secretary of State identified a likely significant effect on the wintering waterfowl assemblage as a result of collision mortality during operation.

### **5.8.1. Collision Mortality: Alone**

Migrant collision risk modelling was undertaken for all the species with potential for connectivity to the Project whilst on passage. This assessment found that predicted collisions apportioned to this SPA and

Ramsar were very small, with none exceeding 1 individual per year (East Anglia One North ES Appendix 12.2 Annex 8). These levels of additional mortality would not increase the background mortality rate by more than 1% and would therefore be undetectable against natural variations. The Applicant concluded that there would be no adverse effect on the integrity of North Norfolk Coast SPA and Ramsar as a result of collisions at the Project alone.

Neither Natural England, nor other IPs, raised any concerns in relation to the Applicant's conclusion of no adverse effect on the integrity of the SPA and Ramsar site. In the SoCG for offshore ornithology between the Applicant and Natural England, the matter of operational impacts resulting from collision risk was stated as agreed [REP8-110]. The ExA was satisfied with the conclusion of no adverse effect on the integrity of the North Norfolk Coast SPA and Ramsar site from the Project alone.

The Secretary of State concludes that an adverse effect on the integrity of the North Norfolk Coast SPA and Ramsar from collision mortality from the Project alone can be excluded.

### 5.8.2. Collision Mortality: In-combination

In-combination collision mortality with the nearby Norfolk Vanguard, Norfolk Boreas, East Anglia Three and East Anglia Two projects were similarly very small (increases in background mortality rates remained less than 1%, (East Anglia One North ES Appendix 12.2 Annex 8).

Neither Natural England, nor other IPs, raised any concerns in relation to the Applicant's conclusion of no adverse effect on the integrity of the SPA and Ramsar site. In the SoCG for offshore ornithology between the Applicant and Natural England, the matter of operational impacts resulting from collision risk was stated as agreed [REP8-110]. The ExA was satisfied with the conclusion of no adverse effect on the integrity of the North Norfolk Coast SPA and Ramsar site from the Project in-combination with other plans or projects.

The Secretary of State concludes that an adverse effect on the integrity of the North Norfolk SPA and Ramsar from collision mortality from the Project in combination with other projects can be excluded.

## 5.9. Appropriate Assessment: Humber Estuary SAC

The Humber Estuary SAC covers an area of 36,657.15 ha. The site contains the second largest coastal plain estuary in the UK and the largest coastal plain estuary on the east coast of Britain. The site is located approximately 174 m from the Project wind farm site and 164 km from the offshore export cable corridor.

The estuary supports a full range of saline conditions, with the range of salinity, substrate and exposure to wave action influencing the estuarine habitats and range of species that utilise them. Suspended sediment concentrations are high and are derived from a variety of sources, including marine sediments and eroding boulder clay along the Holderness coast. The extensive mud and sand flats support a range of benthic communities which in turn are an important feeding resource for birds and fish. Wave exposed sandy shores are found in the outer/open coast areas of the estuary<sup>32</sup>.

The site is designated as an SAC as it hosts the following habitats listed in Annex I:

- Atlantic salt meadows *Glauco-Puccinellietalia maritimae*
- Coastal lagoons
- Dunes with *Hippophae rhamnoides*
- Embryonic shifting dunes
- Estuaries
- Mudflats and sandflats not covered by seawater at low tide

<sup>32</sup> <http://publications.naturalengland.org.uk/publication/5009545743040512>

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- Fixed dunes with herbaceous vegetation ('grey dunes')
- *Salicornia* and other annuals colonising mud and sand
- Sandbanks which are slightly covered by sea water all the time
- Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes')

The site is also designated as an SAC as it hosts the following species in Annex II:

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

The Secretary of State has considered the potential for the Project to constitute an adverse effect on site integrity for each feature for which a significant effect is likely. A LSE was identified for grey seal from disturbance due to underwater noise, vessel interactions and disturbance at haul out sites, and indirect effects on prey during all project phases alone and in-combination with other projects, as well as changes to water quality during operation and decommissioning alone and in-combination with other projects.

The reference population for grey seal that encompasses the SAC is the south-east England Management Unit (MU). The latest grey seal count from the south-east England MU in August 2016 was 8,716. The reference population used in the assessment for the Humber Estuary SAC was the Donna Nook haul-out site. The most recent August count of grey seal at this location in 2017 was 6,526 individuals. This is referred to as the 'Donna Nook count' in the following assessment.

The reference population for the in-combination assessment incorporates the south-east England and north-east England MUs<sup>33</sup> and the Wadden Sea region<sup>34</sup>, taking into account the wide area covered by the in-combination project locations and evidence from telemetry studies, movements and potential foraging ranges. The total reference population for the in-combination assessments is 21,864.

The grey seal density estimates for the Project cable corridor, wind farm site and offshore development area were calculated from the 5km x 5km cells<sup>35</sup>, based on the area overlap with the Project offshore development area. The upper at-sea density estimates used in the assessment were:

- Wind farm site density: 0.01 grey seal per km<sup>2</sup>;
- Offshore cable corridor density: 0.09 grey seal per km<sup>2</sup>; and
- Overall density estimate for offshore development area: 0.03 grey seal per km<sup>2</sup>.

Prior to decommissioning, a detailed decommissioning plan will be produced which will give details of the techniques to be employed and any relevant mitigation measures to be implemented. The Applicant concluded that the potential effects of decommissioning would be the same as for construction, and therefore there would be no adverse effect on the integrity of the SAC.

### 5.9.1. Disturbance due to underwater noise: Alone

#### 5.9.1.1. UXO clearance

The Applicant carried out underwater noise modelling to estimate the potential impact ranges likely to arise during unexploded ordnance ("UXO") clearance, based on the maximum UXO charge sizes that could be located at the Project site [Table 5.66 of APP-468]. The maximum number of grey seal that

<sup>33</sup> IAMMWG. (2013). *Management Units for Marine Mammals in UK Waters* (June 2013).

<sup>34</sup> Brasseur, S., Cremer, J., Czeck, R., Galatius, A., Jeß, A., Körber, P., Pund, R., Siebert, U., Teilmann, J. & Klöpper, S. (2018): *TSEG Grey Seal Surveys in the Wadden Sea and Helgoland in 2017-2018*. Common Wadden Sea Secretariat, Wilhelmshaven, Germany.

<sup>35</sup> Russel, D. J. F., Jones, E. L. and Morris, C. D. (2017): *Updated Seal Usage Maps: The Estimated at-sea Distribution of Grey and Harbour Seals*. Scottish Marine and Freshwater Science Vol 8 No 25, 25pp. DOI: 10.7489/2027-1.

could be at increased risk of permanent auditory injury (Permanent Threshold Shift (“PTS”)) was also estimated, based on the maximum potential impact ranges for UXO clearance of the maximum potential charge size. The assessment was based on the worst-case scenarios for the unweighted peak Sound Pressure Levels (“SPL<sub>peak</sub>”) predicted PTS impact ranges for grey seal. The grey seal density used in the assessment was 0.03/km<sup>2</sup>.

Based on a maximum impact area of 10.18 km<sup>2</sup>, the maximum number of individuals potentially at increased risk of PTS was estimated to be up to 0.64 for unweighted SPL<sub>peak</sub> without mitigation in place. This equates to 0.007% of the south-east England MU, or 0.01% of the Donna Nook count as a worst-case scenario.

A total of 64 grey seal were estimated to be disturbed during UXO clearance at the Project site, which equates to 0.73% of the south-east England MU or 0.98% of the Donna Nook count. This was based on a discharge range of 26 km as advised by SNCBs.

The maximum number of grey seal that could be temporarily disturbed under the scenario of one UXO being detonated during piling was determined to be 127, assuming no overlap in the potential impact ranges. This represents 1.46% of the south-east MU or 1.95% of the Donna Nook count.

Disturbance from UXO detonations would be temporary and short in duration. The worst-case scenario was based on up to 80 clearance operations in the Project offshore development area. This assessed the maximum number of days of UXO clearance (up to 80 days), based on one detonation per day, which could be conducted over several months.

A detailed Marine Mammal Mitigation Plan (MMMP) will be prepared for UXO clearance during the pre-construction phase, when there is more information available on the scale of the clearance required and the most suitable mitigation measures. This will be prepared in consultation with the MMO and relevant SNCBs.

The MMMP for UXO clearance will establish a suitable mitigation zone around the UXO location before detonation. Mitigation measures will be implemented by the Applicant to exclude marine mammals from within the mitigation zone prior to UXO detonation to reduce the risk of PTS.

The measures in the MMMP for UXO clearance will include details of all required mitigation measures, including, but not limited to:

- All detonations taking place in daylight;
- The controlled explosions of the UXO, undertaken by specialist contractors, using the minimum amount of explosives required in order to achieve safe disposal of the device;
- Consideration of any commercially available alternative (e.g. Low Order techniques);
- Monitoring of the mitigation zone by marine mammal observers during daylight hours and when conditions allow suitable visibility, pre- and post-detonation;
- Deployment of passive acoustic monitoring (PAM) devices, if required and if the equipment can be safely deployed and retrieved;
- The activation of acoustic deterrent devices (ADDs);
- If required and where possible and safe to do so, a soft-start procedure using scare charges; and
- The sequencing of detonations, i.e., if there are multiple UXO in close proximity, where practicable this will start with the smallest detonation and end with the larger detonations.



The Applicant cited density estimates<sup>36</sup>, tagging studies<sup>37</sup> and site surveys which have been carried out at the Project site and other offshore wind farms in the area, as presented in ES Chapter 11 Marine Mammals [APP-059]. These indicate that the number of grey seals visiting the area is relatively low and infrequent. The Applicant considered that it was unlikely that all grey seal in the Project offshore development area would be from the Humber Estuary SAC. As such the Applicant concluded there would be no direct effect or overlap with the Humber Estuary SAC, and no potential for an adverse effect on the integrity of the SAC from UXO clearance for the Project alone.

### 5.9.1.2. Piling

Underwater noise modelling was based on the worst-case scenarios during piling for:

- Monopile up to 15 m diameter with maximum hammer energy applied of 4,000 kJ and starting hammer energy of 10% maximum hammer energy (400 kJ); and
- Pin-piles up to 4.6 m diameter with maximum hammer energy applied of 2,400 kJ and starting hammer energy of 10% maximum hammer energy (240 kJ).

Underwater noise modelling results for the maximum predicted ranges and areas for PTS in grey seal were based on the National Oceanographic and Atmospheric Administration (NOAA)<sup>38</sup> criteria for unweighted SPL<sub>peak</sub> and PTS from weighted sound exposure levels, which take into account the species hearing sensitivity, for single strike (SEL<sub>ss</sub>). The number of seals which could potentially be affected based on the density estimates for the Project wind farm site (0.15 /km<sup>2</sup>).

Without mitigation, the estimated maximum number of grey seal that could potentially be at risk of PTS from single strike of the maximum monopile or pin-pile hammer energy was 0.1 individuals. This equates to 0.001% of the south-east England MU, or 0.015% of the Donna Nook count.

The number of individuals that could be at risk of PTS as a result of cumulative exposure during piling of pin-piles with a maximum hammer energy applied of 2,400 kJ was estimated to be 0.1 (0.001% of the south-east England MU or 0.015% of the Donna Nook count).

With consideration of disturbance during piling, data tagging of harbour seals in The Wash during construction of Dudgeon Offshore Wind farm showed clear evidence of individuals avoiding the area during piling, with significantly reduced levels of seal activity at ranges up to 25 km from piling sites<sup>39 40 41</sup>. The Applicant used a 26 km disturbance range and a grey seal density of 0.001/km<sup>2</sup> in the wind farm site to assess potential disturbance. It was acknowledged that this disturbance range is not consistent Natural England's advice, but was agreed by the Project's Expert Topic Group for marine mammals, of which Natural England was a part.

<sup>36</sup> Russell, D. J. F., Jones, E. L. and Morris, C. D. (2017). *Updated Seal Usage Maps: The Estimated at-sea Distribution of Grey and Harbour Seals*. Scottish Marine and Freshwater Science Vol 8 No 25, 25pp. DOI: 10.7489/2027-1.

<sup>37</sup> Russell, D. J. F. and McConnell, B. J. (2014). *Seal at-Sea Distribution, Movements and Behaviour. Report to DECC*. URN: 14D/085. March 2014 (Final Version).

<sup>38</sup> NMFS (National Marine Fisheries Service). (2018). *2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts*. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-59, 167 p.

<sup>39</sup> Russell, D. J. F. (2016). *Movements of Grey Seal that Haul Out on the UK Coast of the Southern North Sea*. Report for the Department of Energy and Climate Change (OESEA-14-47).

<sup>40</sup> SCOS. (2016). *Scientific Advice on Matters Related to the Management of Seal Populations: 2016*. <http://www.smru.st-andrews.ac.uk/files/2017/04/SCOS-2016.pdf>.

<sup>41</sup> SCOS. (2017). *Scientific Advice on Matters Related to the Management of Seal Populations: 2017*. Available at: <http://www.smru.st-andrews.ac.uk>.



It was estimated that 2 grey seal, which is 0.02% of the south-east MU or 0.03% of the Donna Nook count could be temporarily disturbed during piling alone. Under the scenario of piling taking place at the same time as other construction activities, the maximum number of grey seal that could potentially be disturbed was 68. This represents 0.78% of the south-east England MU, or 1.04% of the Donna Nook count.

The potential disturbance from active piling, based on the worst-case scenario for the installation of 60 300 m turbines with pin-piles, six platforms with pin-piles and 10 minute ADD activation per pile, would be 37.4 days within the offshore construction period. The Applicant considered it unlikely that all grey seal in the Project site would be from the SAC and there would be no direct effect or overlap with SAC area.

The MMMP for piling will be developed in the pre-construction period and will be based upon best available information, methodologies and industry best practice. The protocol will be developed with the MMO and relevant SNCBs and will include details of the embedded mitigation, for the soft-start and ramp-up, as well as details of the mitigation zone and any additional mitigation measures required to minimise potential impacts of any PTS, for example, the activation of ADDs prior to the soft-start.

The Applicant estimated that 0.036 grey seal, which is 0.0004% of the south-east England MU (0.0006% of the Donna Nook count) could potentially be disturbed during ADD activation at the Project site. This estimate is based on an area of disturbance of 2.54 km<sup>2</sup> and a grey seal density of 0.02 km<sup>2</sup> in the wind farm site. Disturbance from the proposed mitigation, prior to piling, would be part of the 26 km disturbance range for piling and is therefore not an additive effect to the overall area of potential disturbance.

The Applicant considered that due to the temporary and intermittent duration of underwater noise from piling, along with the relatively low and infrequent number of grey seal in and around the Project site, there was unlikely to be significant disturbance or barrier effects for foraging grey seal. The Applicant concluded there would be no adverse effect on the integrity of the Humber Estuary SAC due to disturbance from piling activity from the Project alone.

### 5.9.1.3. Non-piling construction and maintenance activities

Potential sources of underwater noise during non-piling construction and maintenance activities include seabed preparation, rock dumping and cable installation. The requirements for potential maintenance work are not known at this stage, but the work required and associated effects are expected to be less than during construction.

Noise modelling indicated that grey seal would have to remain in close proximity over a 24 hour period to be exposed to levels of sound that are sufficient to induce PTS or temporary auditory injury (Temporary Threshold Shift (TTS)) from cumulative exposure based on the National Marine Fisheries Service (NMFS)<sup>42</sup> threshold criteria. Risk of auditory injury resulting from dredging or cable laying activity is highly unlikely, therefore disturbance is the only potential underwater noise effect which has been assessed based on the entire offshore development area.

A total of 10 grey seal were estimated to be potentially disturbed within the offshore development area. This is 0.11% of the south-east England MU or 0.15% of the Donna Nook count. It was considered unlikely that all grey seal in the offshore development area would be from the SAC and there would be no direct effect or overlap with the SAC. Disturbance from construction and maintenance activities, other than piling, would be temporary, localised, intermittent in duration and at different locations within the offshore development area. With consideration of this, along with the relatively low and infrequent number of grey seal in and around the Project site, the Applicant considered there to be no adverse effect on the integrity

<sup>42</sup> NMFS (National Marine Fisheries Service). (2018): *2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts*. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-59, 167 p.

of the Humber Estuary SAC due to disturbance from construction and maintenance activities, other than piling, from the Project alone.

### 5.9.1.4. *Vessels during construction, operation and maintenance*

During construction, the approximate number of vessels on site at any one time is estimated to be 74. Requirements for potential maintenance work are currently unknown, however the work required and effects associated with underwater noise and disturbance from vessels would be less than during construction. It is estimated that there could be up to 1 – 2 vessel trips per day for operation and maintenance activities. The potential risk of auditory injury to marine mammals is considered to be highly unlikely, therefore only disturbance as a potential effect associated with underwater noise from vessels was assessed.

The assessment for vessels assumed a worst-case scenario, based on disturbance from 74 vessels predicted during construction. A total of 0.07 grey seals were estimated to be disturbed which equates to 0.001% of the south-east England MU or 0.001% of the Donna Nook count.

Baseline conditions indicate a relatively high level of shipping activity in and around the Project. Based on an average of 4 vessel movements per day during construction and an average of 2 vessels per day operation and maintenance, activity would be relatively small compared to existing vessel traffic. Any disturbance would be temporary, localised, intermittent in duration and at different locations within the Project site. With this considered, the Applicant concluded that there would be no adverse effect on the integrity of the Humber Estuary SAC from underwater noise disturbance from vessel activity resulting from the Project alone.

### 5.9.1.5. *Operational wind turbines*

Currently available data indicates no lasting disturbance or exclusion of seals around wind farm sites during operation. Data suggests that behavioural responses for seals may only occur up to a few hundred meters away from the source of disturbance, and seals have been shown to forage within operational wind farm sites<sup>43</sup>. The potential risk of auditory injury in marine mammals from operational turbines is considered to be highly unlikely, therefore only the potential for disturbance was assessed.

The assessment assumed a worst-case scenario that all grey seal in the Project site could potentially be disturbed. A total of 0.2 grey seal were estimated to be disturbed by the Project, which is 0.002% of the south-east England MU or 0.003% of the Donna Nook count. With consideration of evidence of seal foraging in operational wind farms, along with the relatively low and infrequent number of grey seal in and around the Project wind farm site, the Applicant considered there would be no adverse effect on the integrity of the Humber Estuary SAC due to underwater noise from operational wind turbines from the Project alone.

## 5.9.2. Disturbance due to underwater noise: In-combination

### 5.9.2.1. *UXO clearance*

As it is unlikely that more than one UXO detonation would occur at exactly the same time or on the same day as another UXO detonation, the potential disturbance range of 26 km around one UXO detonation (an area of 2,124 km<sup>2</sup>) was considered a worst-case scenario in the assessment. The average grey seal at sea density estimates for areas of UK and EU offshore wind farms were used which is 0.1 grey seal

<sup>43</sup> Russell, D. J. F., Brasseur, S. M. J. M., Thompson, D., Hastie, G. D., Janik, V. M., Aarts, G., McClintock, B. T., Matthiopoulos, J., Moss, S. E. W and McConnell, B. (2014): *Marine Mammals Trace Anthropogenic Structures at Sea*. Current Biology Vol 24 No 14: R638-R639.

per km<sup>2</sup> <sup>44</sup>, and an average density based on a 50 km buffer around all offshore wind farms included in the assessment.

As it is considered highly unlikely that all grey seal present in the wind farm sites would be from the SAC, it is considered more appropriate to use the in-combination reference population of 21,864 grey seal rather than the south-east England MU. One UXO detonation could potentially disturb up to 212 grey seal, which is 0.97% of the in-combination reference population, or 2.43% of the south-east MU, or 3.25% of the Donna Nook count. As disturbance from UXO detonation would be temporary and intermittent at different locations, the Applicant considered there to be no adverse effect on the integrity of the Humber Estuary SAC resulting from UXO clearance in-combination with other projects.

### 5.9.2.2. Piling

The assessment assumed the most realistic worst-case scenario of concurrent piling between offshore wind farms. This scenario included three other UK offshore wind farms: Creyke Beck A, Sofia (formerly Teesside B), and Norfolk Vanguard. The estimated maximum area of potential disturbance assessed was 14,868 km<sup>2</sup> using the 26 km Effective Deterrent Radius (EDR) without any overlap in potential areas of disturbance at each wind farm or between wind farms. The number of grey seal in the potential impact areas, for single and concurrent piling, was estimated using latest seals-at-sea usage maps to estimate densities<sup>45</sup>.

The maximum number of grey seal which could be potentially disturbed was estimated to be 766 individuals. This represents 3.5% of the in-combination reference population which could potentially be temporarily disturbed, or 8.8% of the south-east England MU, or 11.7% of the count from the Donna Nook haul-out site in the SAC.

With consideration of the temporary and intermittent duration of disturbance due to underwater noise from piling, along with the relatively low percentage of the reference population which could be temporarily affected, the Applicant considered there to be no adverse effect on the integrity of the Humber Estuary SAC due to underwater noise disturbance resulting from piling from the Project in-combination with other projects.

### 5.9.2.3. Non-piling construction, operation and maintenance activities

During construction, there is potential for the Project to overlap with impacts from construction activities other than piling at other offshore wind farms. Noise sources could include vessels, seabed preparation (ploughing/ jetting/ pre-trenching or cutting for installation of cables), and rock dumping for cable protection. The potential sources of disturbance from operation and maintenance activities include operational turbines, vessels, and additional rock dumping or cable re-burial. The realistic worst-case scenario included six UK offshore wind farms: Creyke Beck B, Teesside A, Thanet Extension<sup>46</sup>, Hornsea Project Three, Norfolk Boreas, and East Anglia One North.

The potential temporary disturbance during offshore wind farm construction activities, other than piling, and operational activities was based on the area of the offshore wind farm sites. This was considered highly precautionary as disturbance is likely to be limited to the area in and around where the activity is taking place.

<sup>44</sup> Russell, D. J. F., Jones, E. L. and Morris, C. D. (2017). *Updated Seal Usage Maps: The Estimated at-sea Distribution of Grey and Harbour Seals*. Scottish Marine and Freshwater Science Vol 8 No 25, 25pp. DOI: 10.7489/2027-1.

<sup>45</sup> Russell, D. J. F., Jones, E. L. and Morris, C. D. (2017). *Updated Seal Usage Maps: The Estimated at-sea Distribution of Grey and Harbour Seals*. Scottish Marine and Freshwater Science Vol 8 No 25, 25pp. DOI: 10.7489/2027-1.

<sup>46</sup> The Thanet Extension was refused consent.

The assessment considered that if all the listed wind farms were conducting construction activities, other than piling, at the same time, the estimated cumulative area of disturbance would be 2,864 km<sup>2</sup>. The maximum number of grey seal which could potentially be disturbed was considered to be 158.6, which represents approximately 0.73% of the in-combination reference population, or up to 2.4% of the Donna Nook count.

For the assessment of disturbance from operational and maintenance activities, operational offshore wind farms were considered as part of the baseline if they were in the in-combination reference population area and were operational at the time of the start of Project site specific surveys. Therefore, the offshore wind farms screened into the assessment were those with potential to be newly operational by the Project construction period. The estimated maximum potential in-combination area was up to 1,867 km<sup>2</sup>. The maximum number of grey seal which could be potentially disturbed from underwater noise related to operational and maintenance activities was estimated to be 377 individuals. This represents approximately 1.7% of the in-combination reference population, or up to 5.8% of the Donna Nook count.

With consideration of the temporary and intermittent duration of underwater noise from construction activities, along with the recorded foraging in operational wind farm sites and the relatively low percentage of the reference populations that could be temporarily affected, the Applicant considered there to be no adverse effect on the integrity of the Humber Estuary resulting from underwater noise from construction, operation or maintenance activities.

### 5.9.2.4. *Seismic surveys*

It is not possible to estimate the number of potential seismic surveys by the oil and gas industry which could be carried out during construction activity at the Project. The assumed worst-case scenario was one seismic survey during the construction period. The potential disturbance area, based on a radius of 10 km from each location, was determined to be 314 km<sup>2</sup>. Mean density estimates were used based on the average seal-at-sea density which is 0.1 grey seal per km<sup>2</sup>.

The assessment estimated that one seismic survey could potentially disturb 31.4 grey seal which is 0.14% of the in-combination reference population (0.36% of the south-east MU, or 0.48% of the Donna Nook count). As disturbance from seismic surveys would be temporary, relatively short in duration and at different locations, the Applicant concluded that there would be no adverse effect on the integrity of the Humber Estuary SAC due to seismic surveys occurring in-combination with the Project.

### 5.9.3. **Vessel interactions: Alone**

An increase in vessel traffic is expected during the construction of the Project, with an average of 124 trips per month and four movements per day, which will be a relatively small increase compared to existing vessel traffic. There could be approximately 74 vessels on site at any one time during construction and most would remain within the Project site.

The operation and maintenance ports to be used for the Project are not yet known, but movements to and from any port will be incorporated into any existing vessel routes restricting risk for vessel interaction primarily within the Project site. Indicative operational and maintenance vessel movements indicate that there could be up to 647 round trips per year, an average of 1-2 vessel movements per day. For decommissioning, it is assumed that the potential number of vessels and vessel movements would be the same or less than for construction.

The worst-case scenario for the number of grey seal which could be at increased collision risk during all project phases was assessed based on 5% of the number of individuals which could be present in that area. The assessment estimated that 0.5 grey seal were at potential risk of collision, which equates to 0.006% of the south-east MU, or 0.01% of the Donna Nook count.

Where possible, vessel movements will be incorporated into recognised vessel routes and therefore to areas where grey seal are accustomed to vessels, to reduce increased collision risk. Vessel movements will be kept to the minimum number which is required and vessel operators will use good practice to reduce any risk of collisions. In addition, based on the assumption that grey seal would be disturbed from

the offshore development area due to underwater noise, there should be no potential for increased collision risk in the Project site. As such, the Applicant concluded that there will be no adverse effect on the integrity of the Humber Estuary SAC due to vessel interactions from the Project alone.

### **5.9.4. Vessel interactions: In-combination**

As noted in Section 5.9.3, vessel movements to and from ports will be incorporated within existing vessel routes during construction to reduce the risk of vessel interactions. As the relative increase in vessel movements during operation and maintenance activities is small compared to current ship movements in the area, the increase in collision risk during operation and maintenance was not included in the in-combination assessment.

A precautionary in-combination approach to the number of grey seal which could be at increased collision risk during all project phases was assessed based on 5% of the number of individuals which could be present in the Project site. The assessment determined that up to 10 grey seal could potentially be disturbed, which equates to 0.05% of the in-combination reference population (0.11% of the south-east MU or 0.15% of the Donna Nook count). As such, the Applicant concluded that there will be no adverse effect on the integrity of the Humber Estuary SAC due to vessel interactions from the Project in-combination with other projects.

### **5.9.5. Indirect effects on prey resource: Alone**

The potential effects on fish species during construction can result from increased suspended sediment concentrations, sediment re-deposition, and underwater noise. During operation and maintenance, potential effects can include physical disturbance and loss or changes of seabed habitat, introduction of hard substrate, operational noise, and electromagnetic fields (EMF). During decommissioning it is assumed the potential effects would be the same or less than for construction. Potential effects on prey species during decommissioning can include physical disturbance, loss or changes of habitat, increased suspended sediment concentrations, re-mobilisation of contaminated sediments and underwater noise. The effects of changes in prey availability on grey seal include changes to distribution, abundance and community structure, increased competition with other marine mammal species, increased susceptibility to disease and contaminants, and implications for reproductive success. These impacts could potentially affect individuals throughout their range and throughout the year.

The changes to prey resources during all project phases were assessed based on the entire Project site which is 356 km<sup>2</sup>. Based on a 0.03/km<sup>2</sup> density, the number of grey seals estimated to be present in the area is 10. This represents 0.11% of the south-east MU, or 0.15% of the Donna Nook count. It is, however, unlikely that all grey seal in the Project site would be from Donna Nook, and there is no direct effect or overlap with the Humber Estuary SAC area.

Potential effects on prey species are likely to be intermittent, temporary and highly localised, with the potential for recovery following cessation of the disturbance activity. Any permanent loss or changes of prey habitat will typically represent a small percentage of the potential habitat in the surrounding area. As such, the Applicant concluded that there would be no adverse effect on the integrity of the SAC due to effects on prey resource from the Project alone.

### **5.9.6. Indirect effects on prey resource: In-combination**

The in-combination assessment assumed that any potential effects on grey seal prey species from underwater noise, including piling would be the same or less than those for grey seal. As such, there would be no additional effects other than those assessed for grey seal. If prey species are disturbed from an area, it is highly likely that grey seal would also be disturbed from the area over a potentially wider range than the prey species. Therefore, any changes to prey availability would not additionally affect grey seal as they would already be disturbed from the same area. In addition, any changes to prey resource which could occur would be localised and temporary in nature.



With consideration of the intermittent, temporary and highly localised nature of potential effects on prey species, the Applicant considered there to be no adverse effect on the integrity of the Humber Estuary SAC due to effects on prey resource from the Project in-combination with other projects.

### 5.9.7. Changes to water quality: Alone

During construction, operation, maintenance, and decommissioning, best practice techniques and due diligence regarding pollution measures will be followed. The Environmental Management Plan (EMP) will include mitigation measures embedded into the Project design, including, but not limited to:

- Oils and lubricants used in the wind turbines will be biodegradable, where possible, and all chemicals will be certified to a relevant standard;
- All wind turbines will incorporate additional provisions to retain spilled fluids within the nacelle and tower. Converter and collector stations will be designed with a self-contained bund to contain spills and prevent discharges;
- Best practice procedures will be put in place when transferring oil or fuel between converter or collector stations and service vessels;
- Appropriate spill plan procedures will be implemented to manage unexpected discharge, these will be included in a Marine Pollution Contingency Plan (MPCP) to be agreed post-consent. It is anticipated that the transformers would be filled for their operational life and would not need interim oil changes;
- Inclusion of control measures such as the requirement to carry spill kits and for vessel personnel to undergo training to ensure requirements of the Project EMP are understood and communicated; and
- All work practices and vessels will adhere to the requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78.

The risk of accidental release will be mitigated in line with the EMP and any changes to water quality due to accidental release of contaminants were considered to be negligible.

Disturbance of seabed sediments during construction has the potential to release sediment-bound contaminants, such as heavy metals and hydrocarbons into the water column. Data from the site-specific survey carried out in 2018 indicate that levels of contaminants within the offshore wind farm site and offshore cable corridor are relatively low and potential risk for any effect was considered to be negligible.

The potential for increased suspended sediments from construction activities, such as installation of foundations, drill arisings, cable installation and during any levelling or dredging activities, was assessed in ES Chapter 7 Marine Geology, Oceanography and Physical Processes [APP-055]. The assessment indicated that:

- Measurable increases in suspended sediment concentrations will be found in the water column over a short period of time;
- Disturbed material will remain close to the seabed and settle rapidly within tens of minutes;
- The majority of sediment released at the surface will rapidly settle on the seabed as a highly turbid dynamic plume upon discharge;
- Finer sediment fractions will remain in the water column as a measurable but low concentration plume for up to half a tidal cycle, settling within a kilometre of the disturbance or becoming indistinguishable from background levels; and
- There will be no likely cumulative effect from plumes interacting due to plumes not persisting in the water column for a sufficiently long time.

Any changes in suspended sediment concentrations due construction activities are expected to be short-term, localised and to rapidly return to normal conditions following cessation of activity. Disturbance of sediment during operation and maintenance is expected be considerably less than that during construction.



The Applicant concluded there would be no adverse effect on the integrity of the SAC from changes to water quality resulting from the Project alone.

### 5.9.8. Changes to water quality: In-combination

The in-combination impact of changes to water quality during operation were considered to be no worse than the in-combination impacts assessed for the construction period. During times where there is limited or no construction in the North Sea, impacts will be intermittent, temporary and highly localised to the source project. As such, the Applicant concluded there would be no adverse effects on the integrity of the SPA resulting from changes to water quality from the Project in-combination with other projects.

### 5.9.9. Conclusions

In the Statement of common ground on offshore matters between Natural England and the Applicant, the conclusions of the assessment of effects for all project phases for marine mammals was agreed [REP8-109]. Neither Natural England, nor other IPs, raised any concerns in relation to the Applicant's conclusion of no adverse effect on the integrity on the Humber Estuary SAC.

The Secretary of State concluded that an adverse effect on the integrity of the Humber Estuary SAC from the Project alone or in-combination with other projects can be excluded.

## 5.10. Appropriate Assessment: Southern North Sea SAC

The Southern North Sea SAC was designated on 26 February 2019 for harbour porpoise. The site is located to the east of England and stretches from the central North Sea (north of Dogger Bank) to the Straits of Dover in the south, covering an area of approximately 36,951 km<sup>2</sup>. A mix of habitats, including sandbanks and gravel beds, cover the seabed and water depths range from mean low water to 75m. Most of the site has water depths of less than 40m. The Project offshore development area and offshore cable corridor overlap with the SAC. The total offshore development area covers approximately 3% of the harbour porpoise Southern North Sea SAC wintering area.

The site is designated as an SAC for the Annex II species harbour porpoise.

The site is comprised of two 'seasonal' components. The northern part of the SAC is mainly used by harbour porpoise in the summer months (area of approximately 27,018 km<sup>2</sup>) while the southern part is mainly used in the winter (area of approximately 12,697 km<sup>2</sup>).

Current SNCB guidance states that displacement of harbour porpoise should not exceed 20% of the seasonal component of the SAC at any one time or on average exceed 10% of the seasonal component of the SAC over the duration of that season. The effects of the Project should be considered in the context of the seasonal component of the SAC, rather than the SAC as a whole. A distance of 26 km EDR from an individual percussive piling location should be used to assess the area of the SNS SAC habitat from which harbour porpoise may be disturbed. A buffer of 10 km around seismic operations by the oil and gas industry and a buffer of 26 km for UXO operations should also be applied to assess the area of the SAC from which harbour porpoise may be disturbed.

The reference population used in the Applicant's assessment is the most up to date SCANS-III estimate of harbour porpoise abundance in the North Sea MU, which is 345,373 individuals<sup>47</sup>. The Applicant's reasoning for this is that the JNCC Site Selection Report states that the SAC population estimate is based on a one-month survey in 2015 and it should not be relied upon as an estimated population for the site. The reference population was agreed with Natural England as part of the marine mammal Expert Topic

<sup>47</sup> Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Boerjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M., Scheidat, M. and Teilmann, J. (2017): *Estimates of Cetacean Abundance in European Atlantic Waters in Summer 2016 from the SCANS-III Aerial and Shipboard Surveys*. Wageningen Marine Research.

Group. The harbour porpoise density estimates used in the assessment were based on site specific surveys from the Project site (0.58/km<sup>2</sup>) and SCANS-III survey block L (0.607/km<sup>2</sup>).

The Secretary of State has considered the potential for the Project to constitute an adverse effect on site integrity for each feature for which a significant effect is likely. A likely significant effect upon the harbour porpoise interest feature of the SAC was identified because of the potential for the Project alone and in combination with other plans or projects, to impact the harbour porpoise feature via:

- Underwater noise during all phases
- Vessel interactions during all phases
- Indirect effects on prey during all phases
- Changes to water quality during construction and decommissioning

The Applicant committed that, prior to decommissioning, a detailed decommissioning plan will be produced which will give details of the techniques to be employed and any relevant mitigation measures to be implemented. The Applicant's assessment concluded that the potential effects of decommissioning would be the same as for construction, and therefore there would be no adverse effects in the integrity of the SAC.

### 5.10.1. Underwater noise: Alone

#### 5.10.1.1. UXO clearance

Prior to construction a detailed UXO survey will be completed. Based on the UXO survey for the East Anglia Three Offshore Wind Farm, it is estimated there would be up to 80 UXO within the Project site. The worst-case scenario assumed the maximum duration of UXO clearance would be 80 days based on one detonation per day. There would be no concurrent detonations within the Project site, but potentially more than one UXO detonation could occur in a 24 hour period.

The Applicant's worst-case scenario assumed disturbance for one day per UXO event, that the UXO would not be buried, degraded or subject to other significant attenuation. The assessment also did not account for the variation in noise level at different depths. The impact criteria thresholds and weightings were based on the NOAA criteria for unweighted SPL<sub>peak</sub><sup>48</sup>. The thresholds indicate the onset of PTS. As it is difficult to determine the distance at which an impulsive noise, such as UXO detonation, becomes non-impulsive noise, modelling was conducted using both the impulsive and non-impulsive criteria for PTS weighted Sound Exposure Levels ("SEL") to indicate the difference between potential impact ranges.

The Applicant estimated that the maximum number of harbour porpoise which could potentially be affected by PTS during UXO clearance without mitigation, based on a maximum impact area of 387 km<sup>2</sup> and site-specific survey density, was 235, which is 0.07% of the North Sea MU.

As outlined in Section 5.9.1.1., a detailed MMMP will be prepared for UXO clearance during the pre-construction phase to ensure that adequate mitigation measures are in place to minimise the risk of physical injury or PTS resulting from UXO clearance.

The SNCB recommendation of a 26 km EDR (approximate area of 2,124 km<sup>2</sup>) was used in assessing the effects of potential disturbance from UXO clearance. Disturbance of harbour porpoise from UXO clearance in the Project's offshore development area was not predicted to exceed 20% of the seasonal component of the SAC area at any one time. The average potential overlap was determined to be approximately 12.2% in the winter area and 2.7% in the summer area of the SAC. This was based on the worst-case scenario that all detonations could occur in the same season.

<sup>48</sup> National Marine Fisheries Service. (2018): *2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts*. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-59, 167 p.

The Applicant's assessment indicated that approximately 5.36% of the winter area and 1.18% of the summer area could be affected during UXO clearance based on the worst-case scenario of one detonation per day for 80 days in one season and maximum overlap (2,124 km<sup>2</sup>). This is below the threshold for average displacement of 10% from a seasonal component of the SAC.

The Applicant considered there to be no adverse effect on the integrity of the Southern North Sea SAC resulting from underwater noise disturbance from UXO clearance, from the Project alone.

The Applicant proposed to include UXO clearance activities within the draft DMLs for both the generation and transmission assets, acknowledging that this would be departing from established practice [REP1-107]. Throughout Examination the MMO maintained its position that UXO clearance activities would be best controlled through separate marine licences, rather than within the DMLs [REP1-144, REP9-060]. It was the MMO's view that controlling the activity through a marine licence at a later stage may allow for a more up to date assessment to be taken, including better information about other noisy activities planned in the area within the same timeframe, as well as avoiding the administrative complexity of managing multiple UXO clearance activities through DMLs [EV-103].

The Applicant contended that an important purpose of the DCO regime is to streamline the consenting process and stated that it sought to facilitate this through providing assessment of UXO within the Environmental Statement and the required conditions in the DMLs. It maintained the position that through submission of a UXO method statement, MMMP and Site Integrity Plan (SIP) prior to any UXO activities taking place, the MMO would have the most up to date information to support these approvals.

MMO confirmed by the end of Examination that it was satisfied with the wording of the primary conditions controlling this matter, namely Condition 16 (DML1) and 12 (DML2) of the Applicant's final draft DCO [REP12-013]. Natural England also confirmed it was content with the drafting of these conditions [REP9-069].

It was agreed between the Applicant and the MMO [REP13-045] that the condition would specify at least six months for the MMMP and most parts of the method statement, with detailed plans showing the location of clearance activities and any exclusion zones being required three months prior to the intended start date of the activities [REP12-013]. The six-month timeframe for the submission of the SIP for UXO clearance was welcomed by The Wildlife Trust [REP8-183].

### 5.10.1.2. Piling

The worst-case scenario assessed by the Applicant for piling and details of the criteria applied in the assessment are outlined in Section 5.9.1.2. Without mitigation, the estimated maximum number of harbour porpoise that could be potentially at risk of PTS (SPL<sub>peak</sub>) as a result of a single strike of the maximum monopile hammer energy applied of 4,000 kJ is 2.8, when based on the site-specific survey density. This is 0.0008% of the North Sea MU.

The Applicant's assessment determined that the indicative maximum number of individuals that could be at risk of PTS from cumulative SEL resulting from installation using the maximum monopile hammer energy applied, including soft-start and ramp-up was estimated to be up to 55.8 (0.02% of the North Sea MU). As a result of maximum pin-pile hammer energy applied of 2,400 kJ, the estimated maximum number of harbour porpoise that could potentially be at risk of PTS from cumulative SEL is up to 607, which is 0.2% of the North Sea MU.

Brandt *et. al.*<sup>49</sup> found that harbour porpoise detections declined several hours before the start of piling due to construction related activities and vessels at seven German offshore wind farms. The disturbance

<sup>49</sup> Brandt, M.J., Dragon, C.A., Diederichs, A., Bellmann, M.A., Wahl, V., Piper, W., Nabe- Nielsen, J. and Nehls G. (2018): *Disturbance of Harbour Porpoises During Construction of the First Seven Offshore Wind Farms in Germany*. Marine Ecology Progress Series, 596: 213-232.

of harbour porpoise from the area around the construction site prior to piling will also reduce the risk of PTS.

As outlined in Section 5.9.1.2, the MMMP for piling will be developed in the pre-construction period and will be based upon best available information, methodologies and industry best practice. The protocol will be developed with the MMO and relevant SNCBs.

During ADD activation, the Applicant estimated the harbour porpoise will move 0.9 km, which is a potential disturbance area of 2.54 km<sup>2</sup>. This is approximately 0.02% of the winter Southern North Sea SAC area which would not exceed 20% of the seasonal component of the SAC at any one time. Based on a worst-case scenario of ADD activation every day throughout the season, the estimated average seasonal disturbance would be 0.02%. This would not exceed the average 10% of the seasonal component of the SAC at any one time.

There will be no concurrent piling, but more than one pile could be installed in a single 24 hour period. Potential effects were therefore assessed for single pile installation only. The average potential overlap of potentially disturbed areas in the SAC was determined to be approximately 16.6% in the winter area and 2.7% in the summer area. The maximum potential overlap was determined to be 16.6% in the winter. This would therefore not exceed 20% of the seasonal component of the SAC area at any one time during piling.

The Applicant's calculation of seasonal averages was based on a worst-case scenario of 41.6 days of disturbance occurring in a single season using pin-piles and including ADD activation, soft-start and ramp-up. The estimated seasonal area averages for disturbance were 3.41% in the winter area, based on 16.6% average overlap, and 0.55% in the summer area, based on 2.7% average overlap. Based on the maximum potential overlap with the SAC winter area, the Applicant estimated that piling could occur in 109 days of the 182 days during the winter period and on all 183 days in the summer period without exceeding the 10% seasonal average threshold.

The Applicant estimated that without mitigation, up to 0.74% of the North Sea MU could be temporarily displaced, based on the maximum potential for temporary auditory injury (TTS), and up to 75% or 50% of harbour porpoise being disturbed in the estimated maximum area. It also estimated that without mitigation, up to 0.4% of the North Sea MU could have a behavioural response and be temporarily displaced, based on the same criteria.

Overall, with consideration of the potential effects of PTS and disturbance from piling activities, the Applicant considered there to be no adverse effect on the integrity of the Southern North Sea SAC, from the Project alone.

### 5.10.1.3. Vessels during construction, operation and maintenance

Vessel movements to and from any port will be incorporated within existing vessel routes, therefore any increase in disturbance from underwater noise from vessels during construction will be within the wind farm site and offshore cable corridor.

Any risk of auditory injury from vessels is highly unlikely, therefore, only the effects of disturbance were assessed by the Applicant. Modelling indicated that the area for a behavioural response around each large vessel could be up to 0.07 km<sup>2</sup>. For 74 large vessels predicted to be on site at any one time during construction, the potential area of possible behavioural response for harbour porpoise was estimated to be up to 5.2 km<sup>2</sup> which represents 1.5% of the 341 km<sup>2</sup> total Project site.

Modelling by Heinänen and Skov<sup>50</sup> assessed the threshold level in terms of disturbance impact to be approximately 80 vessels per day within 5 km<sup>2</sup>. The Applicant's assessment determined there to be an increase of approximately 6% in the number of vessels during construction and an approximate increase

<sup>50</sup> Heinänen, S. and Skov, H. (2015). *The Identification of Discrete and Persistent Areas of Relatively High Harbour Porpoise Density in the Wider UK Marine Area*. JNCC Report No.544 JNCC, Peterborough.

of 6.3% during winter periods, compared to baseline vessel numbers. Based on a worst-case scenario, the number of vessels would be unlikely to exceed the Heinänen and Skov threshold level.

The Applicant determined that disturbance of harbour porpoise would not exceed 20% of the seasonal component of the SAC at any one time. Under a worst-case scenario of construction vessels present across all 182 days in the winter period and disturbance of harbour porpoise from the entire array and offshore cable corridor area, disturbance would not, on average, exceed 10% of the seasonal component of the SAC. Of the North Sea MU, the assessment indicated that approximately 0.06% of the population could be disturbed from the total offshore development area.

With regards to operational vessel movements, the Applicant's modelling indicated that the area around each large vessel which could elicit a behavioural response could be up to 0.071 km<sup>2</sup>. For two large vessels per day, the potential maximum area of possible behavioural response is 0.142 km<sup>2</sup>.

The potential effects of underwater noise from vessels during operation and maintenance would be short-term and temporary in nature. Disturbance responses are likely to be limited to the area in the immediate vicinity of the vessel, and marine mammals are expected to return to the area once the disturbance has ceased, or they become habituated to the sound. The number of vessels during operation and maintenance would not exceed the Heinänen and Skov threshold level.

Disturbance of harbour porpoise by operation and maintenance vessels was not expected to exceed 20% of the seasonal component of the SAC at any one time or on average exceed 10% of the seasonal component of the SAC. The estimated number of harbour porpoise that could potentially be disturbed by operation and maintenance vessels was determined by the Applicant to be up to 0.06% of the North Sea MU, based on the worst-case scenario.

The Applicant considered there would be no adverse effect on the integrity of the Southern North Sea SAC due to underwater noise disturbance from vessels, from the Project alone.

#### 5.10.1.4. Barrier effects

The Applicant considered that piling and UXO detonation, and therefore potential barrier effects, would not be constant during the construction period and significant periods when piling and/or UXO clearance will not be taking place are expected. It is assumed that during these periods harbour porpoise could return to the area, rather than move away for the entire construction period. The Applicant committed to ensuring UXO detonation and piling will not occur concurrently or overlap with the offshore development area during the winter period to reduce the potential for any adverse effect. It was estimated that up to 0.4% of the North Sea MU population could be temporarily affected. Under these circumstances, the Applicant concluded there would be no adverse effect on the integrity of the SAC from barrier effects resulting from the Project alone.

#### 5.10.1.5. Operational turbines

Current data suggest that there is no lasting disturbance or exclusion of harbour porpoise around wind farm sites during operation<sup>51 52 53</sup>. Harbour porpoise have been shown to forage within operational wind

<sup>51</sup> Tougaard, J., Carstensen, J. and Teilmann, J. (2009a). *Pile Driving Zone of Responsiveness Extends Beyond 20km for Harbour Porpoises (*Phocoena phocoena* (L.))* (L). J. Acoust. Soc. Am., 126, pp. 11-14.

<sup>52</sup> Tougaard, J., Carstensen, J., Wisch, M.S., Teilmann, J., Bech, N., Skov, H. and Henriksen, O.D. (2005). *Harbour Porpoises on Horns Reef — Effects of the Horns Reef Wind farm. Annual Status Report 2004 to Elsam*. NERI, Roskilde (Also available at: [www.hornsrev.dk](http://www.hornsrev.dk)).

<sup>53</sup> Tougaard, J., Henriksen, O.D. and Miller, L.A. (2009b). *Underwater Noise from Three Types of Offshore Wind Turbines: Estimation of Impact Zones for Harbour Porpoise and Harbour Seals*. Journal of the Acoustic Society of America 125(6): 3766.



farm sites<sup>54</sup> which indicates that movements are not restricted. One study showed that relatively more porpoise were found within the wind farm area compared to two reference areas<sup>55</sup>. The most likely explanations are increased food availability due to attached fauna on and in the hard substrates, as well as the exclusion of fisheries and reduced vessel traffic around turbines.

Modelling by the Applicant indicated that the area of possible behavioural response around each turbine could be up to 0.02 km<sup>2</sup>. For 67 wind turbines associated with the Project, the potential area of possible behavioural response was estimated to be up to 1.34 km<sup>2</sup>.

The maximum area of potential PTS or TTS from cumulative exposure for the 67 turbines was determined to be 1.34 km<sup>2</sup>. This is approximately 0.8% of the winter Southern North Sea SAC. The maximum area of possible behavioural response was estimated to be 0.84 km<sup>2</sup>, which is approximately 0.007% of the winter Southern North Sea SAC. Any disturbance would not exceed 20% of the seasonal component of the SAC at any one time. Disturbance would also not on average exceed 10% of the seasonal component of the SAC. The estimated maximum number of harbour porpoise that could potentially be disturbed was estimated to be 0.51 which is 0.00015% of the North Sea MU, or up to 126 harbour porpoise based on the worst-case scenario of disturbance from the Project site (0.036% of the North Sea MU). The Applicant therefore concluded there would be no adverse effect on the integrity of the SAC from underwater noise from operational turbines resulting from the Project alone.

### 5.10.1.6. Operation and maintenance activities

Requirements for potential maintenance work are not currently known, however, the associated effects would be less than those during construction. The effects from additional cable laying and protection are temporary in nature and would be limited to short periods. Any disturbance is likely to be limited to the area in and around where the activity is taking place.

The Applicant's assessment determined that disturbance would not exceed 20% of the seasonal component of the SAC at any one time during any maintenance activities and that disturbance would not on average exceed 10% of the seasonal component of the Southern North Sea SAC. The estimated maximum number of individuals that could potentially be disturbed was determined to be 0.06% of the North Sea MU. The Applicant therefore concluded there would be no adverse effect on the integrity of the SAC from disturbance from underwater noise associated with operation and maintenance activities.

### 5.10.1.7. Examination conclusions

With consideration of the effects of underwater noise during construction, the proposed mitigation, consideration of alternative mitigation techniques, and mitigation monitoring were matters of discussion during the Examination. The MMO recommended consideration of other noise impact mitigation methods such as bubble curtains [RR-052]. The Wildlife Trust also provided advice regarding mitigation measures and monitoring with respect to their effectiveness [REP1-166]. Natural England raised the possibility of amending conditions for UXO detonation with cluster detonations within a 5 km radius as an alternative mitigation technique. The Applicant included alternative mitigation techniques in the revised MMMP [REP3-042] and IPSIP [REP3-044].

Alternative mitigation techniques, including low order techniques for UXO clearance, were explored by the ExA at Issue Specific Hearing (ISH) 7. The Applicant's response was that these techniques were included in the draft MMMP and IPSIP as potential options, and the use of them is a matter for the final

<sup>54</sup> Lindeboom, H.J., Kouwenhoven, H.J., Bergman, M.J.N., Bouma, S., Brasseur, S., Daan, Fijn, R.C., de Haan, D., Dirksen, S., van Hal, R., Hille Ris Lambers, R., ter Hofstede, Krijgsveld, R.K.L., Leopold, M. and Scheidat, M. (2011). *Short-Term Ecological Effects of an Offshore Wind Farm in the Dutch Coastal Zone; A Compilation*. Environ. Res. Lett. 6 (3).

<sup>55</sup> Scheidat, M., Tougaard, J., Brasseur, S., Carstensen, J., van Polanen Petel, T., Teilmann, J., and Reijnders, P. (2011). *Harbour Porpoise (Phocoena phocoena) and Wind Farms: A Case Study in the Dutch North Sea*. Environ. Res. Lett. 6 (April-June 2011) 025102.

MMMP and SIP. This will be dependent on the information which becomes available through detailed design investigations [EV-102], and experience from other projects. The MMO supported this approach [EV-103]. The matter was further discussed between the Applicant and Natural England [REP9-161]. Clustering UXO detonations as a mitigation tool was removed by the Applicant in the updated versions of the MMMP [REP7-030] and IPSIP [REP7-031]. Natural England [REP8-161] and the MMO [REP9-060] confirmed they were satisfied with this approach.

The Applicant submitted an updated Offshore IPMP in response to discussions with IPs on monitoring requirements. After Natural England and the MMO provided comment on this [REP7-074, REP8-156, REP8-166], the Applicant submitted an updated draft [REP8-027] following discussions with IPs. The MMO and Natural England confirmed they were content [REP9-060, REP9-063].

The mitigation and monitoring measures will be delivered through the draft MMMP [REP8-029] and Offshore IPMP [REP8-027]. Both documents are secured as Certified Plans in Article 36 and Schedule 17 of the DCO.

Natural England stated it was content that with restrictions on noisy events the disturbance thresholds for harbour porpoise would not be exceeded [REP8-168]. Natural England confirmed that it was satisfied that there would be no adverse effect on the integrity of the Southern North Sea SAC from the Project alone [REP8-109, REP8-167].

### 5.10.2. Underwater noise: In-combination

#### 5.10.2.1. UXO clearance

The commitment to the MMMP for UXO clearance, as outlined in Section 5.10.1.1, would reduce the risk of PTS therefore the Project would not contribute to any in-combination effects. The in-combination assessment for underwater noise from UXO clearance therefore only considers disturbance effects. The SIP will also set out the approach to deliver any project mitigation or management measures with other plans or projects in relation which may be required based on the final Project design and actual in-combination scenario at the time of construction. The SIP will be prepared in consultation with the relevant SNCBs during the pre-construction period. The plans or projects considered in the in-combination assessment are listed in the HRAR [APP-043].

The Applicant's assessment concluded that if one UXO detonation was carried out at a time, the potential area of disturbance could be approximately 16% of the winter area or 8% of the summer area, which is below the advised displacement threshold of 20% of the seasonal components of the SAC. An assumed worst-case scenario for the number of days per season when UXO clearance may take place was approximately 80 days on which UXO are detonated for each clearance operation, with up to 40 days in each season. The assessment concluded that on average less than 10% of the seasonal component of the Southern North Sea SAC over the duration of the season could be affected, if there were one UXO operation in the summer or winter area. The number of harbour porpoise that could potentially be disturbed during one UXO clearance operation was estimated to be up to 1,105 individuals, based on the SCANS-III density estimate, which is 0.32% of the North Sea MU reference population.

The Applicant concluded there would be no adverse effect on the integrity of the Southern North Sea SAC resulting from UXO clearance from the Project in-combination with other plans or projects.

#### 5.10.2.2. Piling

The commitment to the MMMP for UXO clearance would reduce risk for PTS and no other activities were identified that could lead to these effects. As such, any in-combination effects for PTS were not assessed and only the potential for in-combination disturbance was considered. The Applicant's assessment was based on single piling at the Project site with single or concurrent piling at the other offshore wind farms which were considered in the assessment, and construction dates between 2025 and 2027. The offshore wind farms included in the in-combination assessment are listed in the HRAR [APP-043].

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Based on the scenario that the Project, Creyke Beck A, Sofia and Norfolk Vanguard are all single piling at the same time, the assessment indicated that less than 20% of the Southern North Sea SAC winter and summer areas could be affected, based on the minimum and average potential overlap for single piling at the offshore wind farms included in the assessment. However, there could be potential to exceed 20% of the Southern North Sea SAC winter area based on the maximum potential overlap for single piling at the offshore wind farms included in the assessment.

Under the realistic worst-case scenario, with single piling at the Project and concurrent piling at Creyke Beck A, Sofia and Norfolk Vanguard, the assessment indicated that less than 20% of the Southern North Sea SAC winter and summer areas would be affected based on the minimum potential overlap. However, there was determined to be potential to exceed 20% of the Southern North Sea SAC winter and summer areas based on the maximum and average potential overlap.

The Applicant committed to working with the SNCBs and the MMO to develop a strategic approach to mitigation if required, subject to the final design and programme of the Project. A SIP will be developed which will set out the approach to delivering any project-level mitigation or management measures to ensure no adverse effects on the integrity of the Southern North Sea SAC regarding disturbance of harbour porpoise. The SIP will be in addition to the MMMP for piling and will be prepared in-consultation with the SNCBs during the pre-construction period.

The Applicant's assessment of seasonal averages for disturbance indicated that on average, more than 10% of the SAC over the duration of the season could be affected, based on the average potential overlap of the winter and summer areas for piling at the offshore wind farms included in the assessment occurring at the same time. The Applicant highlighted that as piling would not be constant and with consideration of the potential down-time due to weather or other technical issues, the number of actual piling days for each project is likely to be considerably less than the worst-case scenario used in the assessment. Appropriate management measures would also be implemented through the SIP.

The Applicant's assessment into the impacts on the North Sea MU indicated that, based on single pile installation at the offshore wind farms included in the assessment, the maximum number of harbour porpoise which could potentially be disturbed was 6,947, which represents approximately 2% of the North Sea MU. Under the realistic worst-case scenario, with single piling at the Project and concurrent piling at the other offshore wind farms included in the assessment, the number of individuals that could potentially be temporarily disturbed was determined to be 12,605. This represents approximately 4% of the North Sea MU. The Applicant highlighted the precautionary nature of the assessment and the appropriate measures which will be implemented through the SIP.

Overall, the Applicant concluded there would be no adverse effect on the integrity of the Southern North Sea SAC resulting from disturbance from piling, in-combination with other plans or projects.

### 5.10.2.3. *Seismic surveys*

The Applicant's worst-case scenario assumed there could be up to two seismic surveys from the oil and gas industry, one in the summer area and one in the winter area, at any one time. The area of disturbance could be up to 314 km<sup>2</sup> (based on a distance of 10 km buffer around survey operations), which is approximately 2.5% of the winter area and approximately 1.2% of the summer area. This is below the 20% displacement threshold of a seasonal component. Under a worst-case scenario that each seismic survey could be up to 10 days, the assessment indicated on average less than 10% of the seasonal component of the SNS SAC over the duration of that season could be affected. The number of harbour porpoise which could potentially be disturbed during one seismic survey, based on the SCANS-III density estimate, was estimated to be up to 163 individuals. This represents 0.05% of the North Sea MU.

The Applicant concluded there would be no adverse effect on the integrity of the Southern North Sea SAC from underwater noise as a result of seismic surveys in-combination with other plans or projects.

### 5.10.2.4. Construction activities other than piling

A total of six UK offshore wind farms were identified in the Applicant's in-combination assessment, as listed in Section 5.9.2.3. The assessment determined that if the six offshore wind farms were conducting non-piling construction activities concurrently, the estimated area of disturbance under the worst-case scenario would be 2,779 km<sup>2</sup>.

Two of the offshore wind farms are in or overlap with the winter area. The Applicant's estimated maximum in-combination area of disturbance for the winter Southern North Sea SAC area was determined to be approximately 1.9%. Three of the offshore wind farms are in or overlap with the summer area, and the estimated maximum in-combination area of disturbance for the summer area was determined to be approximately 5%. Displacement of harbour porpoise would therefore not exceed 20% of the seasonal component of the SAC at any one time. The assessment also indicated that on average, less than 10% of the seasonal component of the Southern North Sea SAC would be affected over each season. Based on the SCANS-III density estimates, the maximum number of harbour porpoise that could potentially be disturbed was estimated to be 2,435 individuals. This represents approximately 0.71% of the North Sea MU.

The Applicant concluded that there would be no adverse effect on the integrity of the Southern North Sea SAC as a result of underwater noise disturbance from construction activities other than piling in-combination with other plans or projects.

### 5.10.2.5. Operation and maintenance activities

Offshore wind farms were considered as part of the baseline if they were operational at the time of the start of Project site specific surveys, as well as those currently under construction or those that will be constructed and operational by 2025.

The assessment indicated that six UK offshore wind farms located in the Southern North Sea SAC could potentially generate disturbance from operation and maintenance activities during the Project construction period. The estimated maximum in-combination area of disturbance was determined to be 915 km<sup>2</sup>.

Three offshore wind farms are situated in the winter area, and the estimated maximum in-combination area of potential disturbance is 521 km<sup>2</sup>, which represents approximately 4.1% of the winter area. Three offshore wind farms are in or overlap with the summer area and the estimated maximum in-combination area of potential disturbance is 649 km<sup>2</sup>, which represents 2.4% of the summer area. Displacement of harbour porpoise would therefore not exceed 20% of the seasonal component of the Southern North Seas SAC area at any one time. The assessment also indicated that on average, less than 10% of the seasonal component of the SAC over the duration of that season could be affected. The number of harbour porpoise that could be temporarily disturbed was determined to be up to 2,808 individuals which represents approximately 0.8% of the North Sea MU.

The Applicant concluded there would be no adverse effect on the integrity of the Southern North Sea SAC as a result of underwater noise disturbance from operation and maintenance activities, in-combination with other plans or projects.

### 5.10.2.6. Examination conclusions

The concerns raised by IPs were focussed on the SNCB noise management guidance [AS-045]. The submitted draft MMMP and IPSIP did not contain formal commitments to limit the number of overall UXO clearance or piling events that could occur in a 24 hour period. Natural England and the MMO [REP1-144] proposed that these events should be limited to one per 24 hour period via a condition in the DML.

In response to comments received from Natural England [REP3-118, REP4-090], TWT [REP4-125], and the MMO [REP4-081], the Applicant submitted updated assessment information [REP1-038], an updated draft MMMP [REP3-042, REP7-030, REP8-029] and an IPSIP [REP3-044, REP7-031, REP8-031]. The updated MMMP and IPSIP committed to no concurrent piling or UXO clearance between East Anglia

One North (EA1N) and the Project. These documents are formally secured by Conditions 26 (piling) and 27 (UXO clearance) in Schedule 13 and Conditions 22 (piling) and 23 (UXO clearance) in Schedule 14.

The updated documents contain specific reference to DML conditions (Condition 28 of Schedule 13 and Condition 24 of Schedule 14) which prevent concurrent piling, concurrent UXO detonations or a combination of the two. The conditions also restrict the number of noisy events to one within a 24-hour period during the Southern North Sea SAC winter period. Natural England confirmed that it was content with the appropriateness of the IPSIP and had confidence in the delivery of the proposed mitigation measures [REP11-123].

Underpinning Natural England's position that an adverse effect on integrity cannot be excluded in-combination with other plans or projects was a concern around the absence of an appropriate mechanism for the control of underwater noise arising from multiple projects in-combination [REP8-166]. This view was supported by The Wildlife Trust [REP4-125, REP8-183].

The MMO referred to its work alongside Natural England under the Southern North Sea Regulators Working Group, which is seeking a mechanism to manage activities which generate noise [REP3-109], as well as its involvement in the recent Review of Consents for the Southern North Sea SAC<sup>56</sup> and subsequent work to vary existing DMLs for a number of other wind farms [REP5-076]. In its representation, the MMO explained the implications of this work in relation to the requirement for and function of SIPs to manage noise impacts to the SAC. The MMO expanded on this work following ISH14 [REP8-156] and in response to the ExA's questions [PD-049] by providing a copy of the Southern North Sea SAC Regulators Working Group Terms of Reference [REP11-116] which confirmed that control of in-combination underwater noise impacts on the Southern North Sea SAC is within the scope of the Group's responsibilities.

Natural England acknowledged the work of the Southern North Sea SAC Regulators Working Group and stated that its position on adverse effects on integrity may change if an agreement on a mechanism can be achieved [REP12-094]. This position is reflected in the final Statement of Common Ground between the Applicant and Natural England [REP8-109].

The Wildlife Trust's final position was that it was hopeful that an appropriate mechanism would be in place before construction on the Project commenced. However, in the absence of such a mechanism, it considered that an adverse effect on the integrity of the SAC in-combination with other plans and projects could not be excluded.

### 5.10.3. Vessel interactions: Alone

Harbour porpoise are small and highly mobile, and are expected to avoid vessel collisions based on their responses to vessel noise<sup>57 58</sup>. Heinänen and Skov<sup>59</sup> indicated a negative relationship between the distribution of harbour porpoise and the number of ships in an area. However, individuals have been observed with signs of physical trauma which indicate vessel strike<sup>60</sup>. Vessel movements, where possible, will be incorporated into recognised vessel routes, therefore to areas where harbour porpoise are

<sup>56</sup> BEIS (2020). *Review of Consented Offshore Wind Farms in the Southern North Sea Harbour Porpoise SAC*.

<sup>57</sup> Thomsen, F., Lüdemann, K., Kafemann, R. and Piper, W. (2006). *Effects of Offshore Windfarm Noise on Marine Mammals and Fish, on Behalf of COWRIE Ltd*.

<sup>58</sup> Evans, P. G. H., Carson, Q., Fisher, P., Jordan, W., Limer, R and Rees, I. (1993). *A Study of the Reactions of Harbour Porpoises to Various Boats in the Coastal Waters of Shetland*. In European Research on Cetaceans. pp 60. Eds Evans. European Cetacean Society, Cambridge.

<sup>59</sup> Heinänen, S. and Skov, H. (2015). *The Identification of Discrete and Persistent Areas of Relatively High Harbour Porpoise Density in the Wider UK Marine Area*. JNCC Report No.544 JNCC, Peterborough.

<sup>60</sup> Wilson, B. Batty, R. S., Daunt, F. and Carter, C. (2007). *Collision Risks Between Marine Renewable Energy Devices and Mammals, Fish and Diving Birds*. Report to the Scottish Executive. Scottish Association for Marine Science, Oban, Scotland.



accustomed to vessels, and also kept to the minimum number required to reduce collision risk. It is also assumed that harbour porpoise would be disturbed from the offshore development area due to increased noise and vessel presence. The increase in vessel movements during the operation and maintenance of the Project will be relatively small compared to current ship movements in the area.

The number of harbour porpoise that could be at increased collision risk from vessels during construction was assessed based on 5 – 10% of the number of animals which could be present in the Project's offshore development area. The estimated number of individuals at increased risk of collision was 9.89 – 19.8 based on the site-specific survey density, which equates to 0.003 – 0.006% of the North Sea MU.

The Applicant concluded there would be no adverse effect on the integrity of the Southern North Sea SAC due to increased risk of vessel collisions from the Project alone.

### **5.10.4. Vessel interactions: In-combination**

The number of harbour porpoise that could be at increased collision risk with vessels was assessed based on a 5% increased collision risk for the number of individuals that could be present in the Project site. The in-combination assessment determined the number of harbour porpoise that could have a potential increase collision risk with vessels in offshore wind farm sites in the North Sea MU during construction would be 204 individuals, which represents 0.06% of the North Sea MU reference population. The Applicant concluded there would be no adverse effect on the integrity of the Southern North Sea SAC resulting from vessel interactions in-combination with other plans or projects under these circumstances.

### **5.10.5. Indirect effects on prey: Alone**

The maximum potential area of temporary physical disturbance and/or temporary loss of habitat to fish during construction was estimated by the Applicant to be approximately 11.04 km<sup>2</sup> in total, which is approximately 3% of the Project site.

Potential effects on prey species during construction from increased suspended sediment concentrations and sediment re-deposition were determined to be low. Modelling predicted that close to the release locations, suspended sediment concentrations would be very high compared to natural background levels, but would be short in duration (seconds to minutes). Within the passive plume, suspended sediment concentrations above background levels were anticipated to be low (less than 10 mg/l) and within the range of natural variability.

The Applicant's assessment concluded that any changes to prey availability resulting in the displacement of all harbour porpoise from the offshore development area would not exceed 20% of the seasonal component of the Southern North Sea SAC at any one time. The assessment also concluded that displacement would not exceed on average 10% of the seasonal component of the SAC, due to potential changes in prey availability. The estimated number of individuals which could potentially be affected was less than 0.06% of the North Sea MU.

Potential effects on prey during operation and maintenance could result from permanent loss of habitat, introduction of hard substrate, operational noise, and EMF. Any introduced hard substrate within the Project site would occupy relatively discrete areas. During operation the maximum total area of habitat loss was estimated to be up to 1.88 km<sup>2</sup>, which is up to 0.55% of the offshore development area.

The background noise levels at operational offshore wind farms have been shown to be small and localised, with no significant effect on fish species. The maximum potential area of disturbance was estimated to be up to 0.53 km<sup>2</sup> for all 67 turbines.

Areas potentially affected by EMFs are expected to be small, limited to the area of the wind farm site and offshore cable corridor, and restricted to the immediate vicinity of the cables (within metres).

The estimated maximum area of disturbance is approximately 8.54 km<sup>2</sup>. The total area that prey species could be displaced during operation and maintenance from was estimated to be up to 10.95 km<sup>2</sup>.

Approximately eight harbour porpoise (0.0023% of the North Sea MU) could be affected, based on the site-specific density estimate.

The assessment concluded that any changes to prey availability during construction and operation resulting in the displacement of all harbour porpoise from the offshore development area would not exceed 20% of the seasonal component of the SNS SAC at any one time. The assessment also concluded that displacement would not exceed on average 10% of the seasonal component of the SAC, due to potential changes in prey availability. The estimated number of individuals which could potentially be affected was less than 0.06% of the North Sea MU.

The Applicant concluded there would be no adverse effect on the integrity of the Southern North Sea SAC resulting from changes in prey availability from the Project alone.

### **5.10.6. Indirect effects on prey: In-combination**

The Applicant's in-combination assessment on potential changes to prey availability assumed that any potential effects on prey species from underwater noise, including piling, would be the same or less than those for harbour porpoise. Therefore, there would be no additional effects other than those assessed for harbour porpoise.

Any effects on prey species are likely to be intermittent, temporary and highly localised, with potential for recovery following cessation of the activity. Any permanent loss or changes of prey habitat typically represent a small percentage of the potential habitat in the surrounding area. As such, the Applicant concluded there would be no adverse effect on the integrity of the Southern North Sea SAC arising from changes in prey availability from the Project in-combination with other plans or projects.

### **5.10.7. Changes to water quality: Alone**

The controls and mitigation which will be implemented to avoid adverse effects resulting from changes to water quality are outlined in Section 5.9.7. The Applicant's assessment determined that any changes to water quality due to the Project that could result in the displacement of all harbour porpoise from the entire wind farm site and cable corridor area, would not exceed 20% of the seasonal component of the Southern North Sea SAC at any one time. The assessment also concluded that this would not on average exceed 10% of the seasonal component of the Southern North Seas SAC over the duration of that season during construction at the Project. The estimated maximum number of harbour porpoise that could potentially be affected by potential changes to water quality during construction is less than 0.06% of the North Sea MU.

The Applicant concluded there would be no adverse effect on the integrity of the Southern North Sea SAC from changes to water quality resulting from the Project alone.

### **5.10.8. Changes to water quality: In-combination**

The in-combination impact of changes to water quality during operation were considered by the Applicant to be no worse than the in-combination impacts assessed for the construction period. During times where there is limited or no construction in the North Sea, impacts will be intermittent, temporary and highly localised to the source project. As such, the Applicant concluded there would be no adverse effect on the integrity of the Southern North Sea SAC resulting from changes to water quality from the Project in-combination with other plans or projects.

## **5.11. Conclusions**

The Applicant's conclusion of no adverse effect on the integrity of the Southern North Sea SAC from any of the impact-effect pathways on harbour porpoise [APP-043] was not accepted by Natural England [RR-059]. In addition, The Wildlife Trust [RR-091] and the MMO [RR-052] also expressed concerns that adverse effects on the integrity of the Southern North Sea SAC could not be excluded from the Project alone or in-combination due to concerns about the effects on harbour porpoise.

The Wildlife Trust expressed concerns about the exclusion of fishing activities from consideration in the in-combination assessment. The ExA noted that the scope of the in-combination assessment was agreed with Natural England during the pre-application period and follows the approach taken by the Secretary of State on other offshore wind farms [APP465] [REP8-123]. Rationale was also provided by the Applicant that fishing activity is long established and not predicted to increase. The ExA considered that the effects of existing and continuing fishing activity have been assessed in the baseline as agreed with Natural England, and there is no evidence of additional activity which could contribute to adverse effects above those already assessed. The ExA was satisfied that the in-combination assessment is robust in this regard and that fishing activity can be included in the baseline.

Representations provided by Natural England, The Wildlife Trust, and the MMO set out concerns regarding the control of UXO clearance and piling activities, and the delivery of an adequate regulatory mechanism to manage underwater noise effects during the construction phase in-combination with other plans and projects, as discussed in Section **Error! Reference source not found.** Whale and Dolphin Conservation also expressed concerns about adverse effects of construction noise on harbour porpoise [RR-090], however, did not submit further representations during Examination.

With consideration of the effects of underwater noise from the Project alone, the ExA stated it was satisfied that an adverse effect on the integrity of the Southern North Sea SAC can be excluded from the effects of the Project alone, dependent on the implementation of the mitigation measures to be agreed with relevant stakeholders as secured in the DCO. The Secretary of State agrees with this conclusion.

The effects of underwater noise from the Project in-combination with other plans and projects were discussed throughout the Examination and representations made by IPs with regards to this are summarised in Section **Error! Reference source not found.** Although Natural England and The Wildlife Trust remained concerned about the absence of a strategic mechanism for the control of underwater noise from multiple SIPs, the ExA noted Natural England's agreement [REP11-123] that the IPSIP [REP8-031] would provide an appropriate framework to agree mitigation measures and the scope of measures within the IPSIP are appropriate. Natural England also agreed that through the IPSIP, the Applicant would use the most appropriate measures for the project based on best knowledge, evidence and proven available technology at the time of construction. Natural England had also stated it had confidence that the mitigation measures contained in the IPSIP are deliverable. The ExA highlighted that Natural England was clear that its outstanding concerns in this respect related to mechanisms for strategic regulatory control, rather than further actions required of the Project [REP8-167].

The ExA's view was that subject to the implementation of the mitigation and control measures secured by the DMLs, underwater noise disturbance from the Project in-combination with other plans or projects, would not have an adverse effect on the harbour porpoise feature of the Southern North Sea SAC. Evidence indicates that there is a realistic prospect that a suitable strategic mechanism will be agreed for the control of in-combination effects at the time of construction. The ExA concluded that an adverse effect on the integrity of the Southern North Sea SAC could be excluded and this conclusion does not depend on the actions of the Southern North Sea SAC Regulators Working Group.

The Secretary of State has considered Natural England and The Wildlife Trust's concerns regarding the current absence of a strategic mechanism for the control of in-combination underwater noise effects during construction. He is also aware that progress is being made to address this through the work of the Southern North Sea SAC Regulators Working Group, as evidenced by submissions made by the MMO during Examination. The Secretary of State agrees that it is not for the Project to address strategic regulatory control matters and, as such, no further actions are required from the Applicant. He also notes Natural England's agreement that the framework outlined in the IPSIP is appropriate and deliverable.

The Secretary of State concludes that an adverse effect on the integrity of the Southern North Sea SAC from the Project alone or in-combination with other projects can be excluded.

### 5.12. Appropriate Assessment: The Wash and North Norfolk Coast SAC

The Wash and North Norfolk Coast SAC covers an area of approximately 1,078 km<sup>2</sup>. It comprises a range of coastal, intertidal and marine habitats extending along the Lincolnshire and Norfolk coastlines. It has extensive areas of varying, but predominantly sandy, sediments subject to a range of conditions. The SAC is 99 km from the offshore wind farm site and 90 km from the cable corridor at its nearest point.

The site is designated for a range of Annex I habitats. The site is also designated for the Annex II species harbour seal and otter.

The Secretary of State has considered the potential for the Project to constitute an adverse effect on site integrity for each feature for which a significant effect is likely. The Secretary of State has identified a likely significant effect on the harbour seal feature from:

- Underwater noise during construction, operation and decommissioning
- Vessel interactions and disturbance at haul out sites during construction, operation and decommissioning
- Indirect effects on prey during construction, operation and decommissioning
- Changes to water quality during construction and decommissioning

All potential LSE were assessed for impacts alone and in-combination with other plans and projects.

The total harbour seal count at the main haul-out sites within The Wash and North Norfolk Coast SAC in 2017 was 3,609<sup>61</sup>. This was used as the site population of which potential effects were assessed, and is referred to as 'The Wash and Blakeney Point count'.

The reference population for the project-alone assessment was the south-east England MU of 4,965 harbour seals. The in-combination assessment took account of the wide area covered by the in-combination project locations and evidence from telemetry studies, movements and potential foraging ranges. The reference unit for harbour seal for the in-combination assessment incorporates the south-east England MU and the Wadden Sea, totalling 44,965 individuals<sup>62</sup>.

The harbour seal density estimates for the Project cable corridor, wind farm site and offshore development area were calculated from 5km x 5km cells, based on the area overlap with the Project offshore development area. The upper at-sea density estimates used in the assessment were:

- Wind farm site density: 0.0005 harbour seal per km<sup>2</sup>;
- Offshore cable corridor density: 0.002 harbour seal per km<sup>2</sup>; and
- Overall density estimate for offshore development area: 0.008 harbour seal per km<sup>2</sup>.

Prior to decommissioning, a detailed decommissioning plan will be produced which will give details of the techniques to be employed and any relevant mitigation measures to be implemented. The Applicant's assessment concluded that the potential effects of decommissioning would be the same as for construction, and therefore there would be no adverse effect on the integrity of The Wash and North Norfolk Coast SAC.

<sup>61</sup> SCOS (2017). *Scientific Advice on Matters Related to the Management of Seal Populations: 2017*. Available at: <http://www.smru.st-andrews.ac.uk>.

<sup>62</sup> Galatius A., Brasseur S., Cremer J., Czeck R., Jeß A., Körber P., Pund R., Siebert U., Teilmann J. & Klöpper S. (2018) *Aerial Surveys of Harbour Seals in the Wadden Sea in 2018*. Common Wadden Sea Secretariat, Wilhelmshaven, Germany.

### 5.12.1. Disturbance due to underwater noise: Alone

#### 5.12.1.1. UXO clearance

The methodology and worst-case scenarios outlined in Section 5.9.1.1 were also applied in the assessment of harbour seal in the North Norfolk Coast SAC. The estimated harbour seal density in the offshore development area was 0.005/km<sup>2</sup>. Based on a maximum impact area of 21.24 km<sup>2</sup>, the maximum number of individuals potentially at increased risk of PTS was estimated to be up to 0.17 for unweighted SPL<sub>peak</sub> without mitigation in place. This equates to 0.0034% of the south-east England MU or 0.005% of The Wash and Blakeney Point count.

It was estimated that a total of 17 harbour seal could be disturbed during UXO clearance at the Project, which equates to 0.34% of the south-east England MU or 0.47% of The Wash and Blakeney Point count.

Under the scenario of one UXO detonation during piling, the maximum number of harbour seal that could be temporarily disturbed was determined to be 34. This represents 0.7% of the south-east MU or 0.94% of The Wash and Blakeney Point count.

As outlined in Section 5.9.1.1., a detailed MMMP will be prepared for UXO clearance during the pre-construction phase to ensure adequate mitigation measures are in place.

The Applicant cited density estimates<sup>63</sup>, tagging studies<sup>64</sup> and site surveys which have been carried out at the Project site and other offshore wind farms in the area, as presented in ES Chapter 11 Marine Mammals [APP-059], which indicate that the number of harbour seal frequenting the area is relatively low and infrequent. It was determined to be unlikely that all harbour seal in the Project site would be from The Wash and North Norfolk Coast SAC. As such the Applicant concluded there would be no direct effect or overlap with The Wash and North Norfolk Coast SAC, and no adverse effect on the integrity of The Wash and North Norfolk Coast SAC from UXO clearance from the Project alone.

#### 5.12.1.2. Piling

The worst-case scenario assessed for piling and details of the criteria used is outlined in Section 5.9.1.2. The number of seals which could potentially be affected was estimated based on harbour seal density estimates for the Project site (0.0007/km<sup>2</sup>).

Without mitigation, the estimated maximum number of harbour seal that could potentially be at risk of PTS from a single strike of the maximum monopile or pin-pile hammer energy was 0.000005 individuals. This equates to 0.0000001% of the south-east England MU, or 0.000001% of The Wash and Blakeney Point count.

With consideration of disturbance during piling, data from tagged harbour seals in the Wash indicated that seals were not excluded from the vicinity of the Lincs Offshore Wind Farm during the overall construction phase, but there was evidence of avoidance during pile driving, with significantly reduced levels of seal activity at ranges up to 25 km from piling sites<sup>65 66 67</sup>. Therefore a 26 km disturbance range

<sup>63</sup> Russell, D. J. F., Jones, E. L. and Morris, C. D. (2017). *Updated Seal Usage Maps: The Estimated at-sea Distribution of Grey and Harbour Seals*. Scottish Marine and Freshwater Science Vol 8 No 25, 25pp. DOI: 10.7489/2027-1.

<sup>64</sup> Russell, D. J. F. and McConnell, B. J. (2014). *Seal At-Sea Distribution, Movements and Behaviour*. Report to DECC. URN: 14D/085. March 2014 (final version).

<sup>65</sup> Russell, D. J. F. (2016). *Movements of Grey Seal that Haul Out on the UK Coast of the Southern North Sea*. Report for the Department of Energy and Climate Change (OESEA-14-47).

<sup>66</sup> SCOS. (2016). *Scientific Advice on Matters Related to the Management of Seal Populations: 2016*. <http://www.smru.st-andrews.ac.uk/files/2017/04/SCOS-2016.pdf>.

<sup>67</sup> SCOS. (2017). *Scientific Advice on Matters Related to the Management of Seal Populations: 2017*. Available at: <http://www.smru.st-andrews.ac.uk>.



was applied. It was acknowledged that this disturbance range is not Natural England's advice, but this approach was agreed by the Project's Expert Topic Group for marine mammals, of which Natural England was part of.

It was estimated that one harbour seal, which is 0.02% of the south-east MU or 0.03% of The Wash and Blakeney Point count could be disturbed during piling alone.

Under the scenario of piling occurring at the same time as other construction activities, the maximum number of harbour seal that could potentially be disturbed was determined to be 18. This represents 0.36% of the south-east England MU, or 0.5% of The Wash and Blakeney Point count.

The potential disturbance from active piling, based on the worst-case scenario for the installation of 60 300 m turbines with pin-piles, six platforms with pin-piles and 10 minute ADD activation per pile, would be 41.6 days within the offshore construction period.

As outlined in Section 5.9.1.2, the MMMP for piling will be developed in the pre-construction period and will be based upon best available information, methodologies and industry best practice. The protocol will be developed with the MMO and relevant SNCBs.

The Applicant estimated that 0.0013 harbour seal, which is 0.00003% of the south-east England MU (0.00004% of The Wash and Blakeney Point count) could potentially be disturbed during ADD activation at the Project site. This estimate is based on an area of disturbance of 2.54 km<sup>2</sup> and a harbour seal density of 0.0007 km<sup>2</sup> in the wind farm site. Disturbance from the proposed mitigation, prior to piling, would be part of the 26 km disturbance range for piling and is therefore not an additive effect to the overall area of potential disturbance.

The Applicant considered that due to the temporary and intermittent duration of underwater noise from piling, combined with the relatively low and infrequent number of harbour seal in and around the Project site, there was unlikely to be significant disturbance or barrier effects for foraging harbour seal. The Applicant therefore concluded there will be no adverse effect on the integrity of The Wash and North Norfolk Coast SAC due to disturbance from piling activity from the Project alone.

### *5.12.1.3. Non-piling construction and maintenance activities*

The requirements for potential maintenance work are not known at this stage, but the required work and associated effects are expected to be less than during construction. Risk of auditory injury resulting from dredging or cable laying activity is highly unlikely, therefore disturbance is the only potential underwater noise effect which has been assessed based on the entire offshore development area.

A total of 2.7 harbour seal were estimated to be potentially disturbed within the offshore development area. This is 0.05% of the south-east England MU or 0.08% of The Wash and Blakeney count. It was considered unlikely that all harbour seal in the offshore development area would be from the SAC and there would be no direct effect or overlap with the SAC area. Disturbance from construction and maintenance activities, other than piling, would be temporary, localised, intermittent in duration and at different locations within the offshore development area. With consideration of this, along with the relatively low and infrequent number of harbour seal in and around the Project offshore development area, the Applicant considered there to be no adverse effect on the integrity of The Wash and North Norfolk Coast SAC due to disturbance from construction and maintenance activities, other than piling, from the Project alone.

### *5.12.1.4. Vessels during construction, operation and maintenance*

The potential risk of auditory injury in marine mammals from vessels is highly unlikely, therefore only disturbance as a potential effect associated with noise from vessels was assessed.

A total of 0.02 harbour seals were estimated to be disturbed which equates to 0.0004% of the south-east England MU or 0.0005% of The Wash and Blakeney Point count.

Any increases in vessel activity resulting from the Project would be relatively small compared to existing vessel traffic. Any disturbance would be temporary, localised, intermittent in duration and at different locations within the offshore development area. With this considered, the Applicant concluded that there would be no adverse effect on the integrity of The Wash and North Norfolk Coast SAC from underwater noise disturbance from vessel activity resulting from the Project alone.

### 5.12.1.5. Operational wind turbines

Currently available data indicates no lasting disturbance or exclusion of seals around wind farm sites during operation. Data suggests that behavioural responses for seals may only occur up to a few hundred meters away from the source of disturbance, and seals have been shown to forage within operational wind farm sites<sup>68</sup>. The potential risk of auditory injury in marine mammals highly unlikely and therefore only disturbance as a potential effect associated with noise from operational wind turbines was assessed.

The assessment assumed a worst-case scenario that all grey seal in the Project wind farm site could potentially be disturbed. A total of 0.1 harbour seal were estimated to be disturbed from the Project, which is 0.002% of the south-east England MU or 0.003% of The Wash and Blakeney Point count. With consideration of evidence of seal foraging in operational wind farms, along with the relatively low and infrequent number of harbour seal in and around the Project wind farm site, the Applicant considered there would be no adverse effect on the integrity of The Wash and North Norfolk Coast SAC due to underwater noise disturbance from operational wind turbines from the Project alone.

## 5.12.2. Disturbance due to underwater noise: In-combination

### 5.12.2.1. UXO clearance

As it is unlikely that more than one UXO detonation would occur at exactly the same time or on the same day as another UXO detonation, the potential disturbance range of 26 km around one UXO detonation (an area of 2,124 km<sup>2</sup>) was considered a worst-case scenario in the assessment. The average harbour seal at sea density estimates for areas of the UK and EU offshore wind farms were used which is 0.02 harbour seal per km<sup>2</sup><sup>69</sup>, and an average density based on a 50 km buffer around all offshore wind farms included in the assessment.

As it is considered highly unlikely that all harbour seal present in the wind farm sites would be from the SAC, it is considered more appropriate to use the in-combination reference population of 44,965 harbour seal rather than the south-east England MU. One UXO detonation could potentially disturb up to 42.5 harbour seal, which is 0.09% of the in-combination reference population, or 0.86% of the south-east MU (1.18% of The Wash and Blakeney Point count).

As disturbance from UXO detonation would be temporary and intermittent at different locations, the Applicant considered there to be no adverse effect on the integrity of The Wash and North Norfolk Coast SAC resulting from UXO clearance in-combination with other plans or projects.

### 5.12.2.2. Piling

The Applicant's assessment assumes a worst-case scenario of concurrent piling between offshore wind farms. This scenario includes three other UK offshore wind farms: Creyke Beck A, Sofia (formerly Teesside B), and Norfolk Vanguard. The estimated maximum area of potential disturbance assessed was 14,868 km<sup>2</sup>, using the 26 km EDR without any overlap in potential areas of disturbance at each wind farm

<sup>68</sup> Russell, D. J. F., Brasseur, S. M. J. M., Thompson, D., Hastie, G. D., Janik, V. M., Aarts, G., McClintock, B. T., Matthiopoulos, J., Moss, S. E. W and McConnell, B. (2014). *Marine Mammals Trace Anthropogenic Structures at Sea*. Current Biology Vol 24 No 14: R638-R639.

<sup>69</sup> Russell, D. J. F., Jones, E. L. and Morris, C. D. (2017). *Updated Seal Usage Maps: The Estimated at-sea Distribution of Grey and Harbour Seals*. Scottish Marine and Freshwater Science Vol 8 No 25, 25pp. DOI: 10.7489/2027-1.

or between wind farms. The number of harbour seal in the potential impact areas, for single and concurrent piling, was estimated using latest seals-at-sea usage maps to estimate densities<sup>70</sup>.

The maximum number of harbour seal which could be potentially disturbed was estimated to be 21.3 individuals. This represents 0.05% of the in-combination reference population which could potentially be temporarily disturbed, or 0.43% of the south-east England MU, or 0.59% of The Wash and Blakeney Point count.

With consideration of the temporary and intermittent duration of disturbance due to underwater noise from piling, along with the relatively low percentage of the reference population which could be temporarily affected, the Applicant considered there to be no adverse effect on the integrity of The Wash and North Norfolk Coast SAC due to underwater noise disturbance resulting from piling from the Project, in-combination with other plans or projects.

### 5.12.2.3. *Non-piling construction, operation and maintenance activities*

During construction, there is potential for the Project to overlap with impacts from construction activities other than piling at other offshore wind farms. Noise sources could include vessels, seabed preparation, ploughing/jetting/pre-trenching or cutting for installation of cables and rock dumping for protection of cable. The potential sources of disturbance resulting from operation and maintenance activities include operational turbines, vessels, and additional rock dumping or cable re-burial. The worst-case scenario included six UK offshore wind farms: Creyke Beck B; Teesside A; Thanet Extension<sup>71</sup>; Hornsea Project Three; Norfolk Boreas; and East Anglia One North.

The potential temporary disturbance during offshore wind farm construction activities, other than piling, and operational activities was based on the area of the offshore wind farm sites. This was considered highly precautionary as disturbance is likely to be limited to the area in and around where the activity is taking place.

The Applicant's assessment considered that if all the wind farms listed above were conducting construction activities, other than piling, at the same time, the estimated cumulative area of disturbance would be 2,864 km<sup>2</sup>. The maximum number of harbour seal which could potentially be disturbed is 11, which represents approximately 0.02% of the in-combination reference population, or up to 0.3% of The Wash and Blakeney Point count.

For the assessment of disturbance from operational and maintenance activities, operational offshore wind farms were considered as part of the baseline if they were in the in-combination reference population area and were operational at the time of the start of Project site specific surveys. Therefore, only offshore wind farms screened into the assessment were those with the potential to be newly operational by the Project construction period. The estimated maximum potential in-combination area was up to 1,867 km<sup>2</sup>. The maximum number of harbour seal which could be potentially disturbed from underwater noise from operational and maintenance activities was estimated by the Applicant to be 89 individuals. This represents approximately 0.27% of the in-combination reference population, or up to 3.35% of The Wash and Blakeney Point count.

With consideration of the temporary and intermittent duration of underwater noise from construction activities, along with recorded foraging in operational wind farm sites and the relatively low percentage of the reference populations that could be temporarily affected, the Applicant considered there to be no adverse effect on the integrity of The Wash and North Norfolk Coast SAC resulting from underwater noise from construction, operation or maintenance activities.

<sup>70</sup> Russell, D. J. F., Jones, E. L. and Morris, C. D. (2017). *Updated Seal Usage Maps: The Estimated at-sea Distribution of Grey and Harbour Seals*. Scottish Marine and Freshwater Science Vol 8 No 25, 25pp. DOI: 10.7489/2027-1.

<sup>71</sup> The Thanet Extension project was not granted consent.

### 5.12.2.4. Seismic surveys

It is not possible to estimate the number of potential seismic surveys by the oil and gas industry which could be carried out during construction activity at the Project. An assumed worst-case scenario was potentially one seismic survey during the construction period. The potential disturbance area based on a radius of 10 km from each location was determined to be 314 km<sup>2</sup>. Mean density estimates were used based on the average seal-at-sea density estimate which is 0.02 harbour seal per km<sup>2</sup>.

The assessment estimated that one seismic survey could potentially disturb 6.3 harbour seal which is 0.014% of the in-combination reference population (0.13% of the south-east MU, or 0.17% of The Wash and Blakeney Point count). As disturbance from seismic surveys would be temporary, relatively short in duration and at different locations, the Applicant concluded that there would be no adverse effect on the integrity of The Wash and North Norfolk Coast SAC due to seismic surveys occurring in-combination with the Project.

### 5.12.3. Vessel interactions: Alone

A precautionary worst-case scenario approach, as outlined in Section 5.9.3, was carried out to determine the number of harbour seal which could be at increased collision risk during all project phases, based on 5% of the number of individuals which could be present in that area. The Applicant's assessment estimated that 0.14 harbour seal could potentially be risk of collision, which equates to 0.003% of the south-east MU, or 0.004% of The Wash and Blakeney Point count.

Where possible, vessel movements will be incorporated into recognised vessel routes and therefore to areas where harbour seal are accustomed to vessels, to reduce increased collision risk. Vessel movements will be kept to the minimum number required and vessel operators will use good practice to reduce any risk of collisions. In addition, based on the assumption that harbour seal would be disturbed from the offshore development area due to underwater noise, there should be no potential for increased collision risk in the offshore development area. As such, the Applicant concluded that there will be no adverse effect on the integrity of The Wash and North Norfolk Coast SAC due to vessel interactions from the Project alone.

### 5.12.4. Vessel interactions: In-combination

As noted in Section 5.9.3, vessel movements to and from ports will be incorporated within existing vessel routes during construction to reduce the risk of vessel interactions. As the relative increase in vessel movements during operation and maintenance activities is small compared to current ship movements in the area, the increase in collision risk during operation and maintenance was not included in the in-combination assessment.

A precautionary in-combination approach to the number of harbour seal which could be at increased collision risk during all project phases was assessed based on 5% of the number of individuals which could be present in the wind farm areas. The assessment determined that up to 0.6 harbour seal could potentially be disturbed, which equates to 0.001% of the in-combination reference population (0.001% of the south-east MU or 0.02% of the The Wash and Blakeney Point count). As such, the Applicant concluded that there will be no adverse effect on the integrity of The Wash and North Norfolk Coast SAC due to vessel interactions from the Project in-combination with other plans or projects.

### 5.12.5. Indirect effects on prey resource: Alone

The potential effects on fish species during all project Phases is outlined in Section 5.9.5. The changes to prey resources during all project phases were assessed based on the entire Project site which is 341 km<sup>2</sup> as a worst-case scenario. Based on a 0.008/km<sup>2</sup> density, the number of harbour seal estimated to be present in the area is 2.7. This represents 0.05% of the south-east MU, or 0.07% of The Wash and Blakeney Point count. It is, however, unlikely that all harbour seal in the Project offshore development area would be from the SAC, and there is no direct effect or overlap with The Wash and North Norfolk Coast SAC area.

Potential effects on prey species are likely to be intermittent, temporary and highly localised, with the potential for recovery following cessation of the disturbance activity. Any permanent loss of changes of prey habitat will typically represent a small percentage of the potential habitat in the surrounding area. As such, the Applicant concluded that there would be no adverse effect on the integrity of The Wash and North Norfolk Coast SAC due to effects on prey resource from the Project alone.

### **5.12.6. Indirect effects on prey resource: In-combination**

The in-combination assessment assumed that any potential effects on harbour seal prey species from underwater noise, including piling would be the same or less than those for harbour seal. As such, there would be no additional effects other than those assessed for harbour seal. If prey species are disturbed from an area, it is highly likely that harbour seal would also be disturbed from the area over a potentially wider range than the prey species. Therefore, any changes to prey availability would not additionally affect harbour seal as they would already be disturbed from the same area. In addition, any changes to prey resource which could occur would be localised and temporary in nature.

With consideration of the intermittent, temporary and highly localised nature of potential effects on prey species, the Applicant considered there to be no adverse effect on the integrity of The Wash and North Norfolk Coast SAC due to effects on prey resource from the Project in-combination with other plans or projects.

### **5.12.7. Changes to water quality: Alone**

The controls and mitigation which will be implemented to avoid adverse effects resulting from changes to water quality are outlined in Section 5.9.7. The Applicant concluded there would be no adverse effect on the integrity of The Wash and North Norfolk Coast SAC from changes to water quality resulting from the Project alone.

### **5.12.8. Changes to water quality: In-combination**

The in-combination impact of changes to water quality during operation were considered to be no worse than the in-combination impacts assessed for the construction period. During times where there is limited or no construction in the North Sea, impacts will be intermittent, temporary and highly localised to the source project. As such, the Applicant concluded there would be no adverse effect on the integrity of The Wash and North Norfolk Coast SAC resulting from changes to water quality from the Project in-combination with other plans or projects.

### **5.12.9. Conclusion**

In the Statement of Common Ground on offshore matters between Natural England and the Applicant, the conclusions of the assessment for effects for all project phases for marine mammals was agreed [REP8-109]. Neither Natural England, nor other interested parties, raised any concerns in relation to the Applicant's conclusion of no adverse effect on the integrity of The Wash and North Norfolk Coast SAC.

The Secretary of State concludes that an adverse effect on the integrity of The Wash and North Norfolk Coast SAC from the Project alone or in-combination with other projects can be excluded.



## 6. Habitats Regulations Assessment Overall Conclusions

The Secretary of State has carefully considered the information presented before and during the Examination, including the RIES, the ES, representations made by Interested Parties, and the ExA's report itself. He considers that the Project has the potential to have an LSE on fifteen protected sites when considered alone and in-combination with other plans or projects. These sites are listed below:

- Alde-Ore Estuary SPA
- Alde-Ore Estuary Ramsar site
- Breydon Water SPA
- Breydon Water Ramsar site
- Broadland SPA
- Broadland Ramsar site
- Flamborough and Filey Coast SPA
- Greater Wash SPA
- Humber Estuary SAC
- North Norfolk Coast SPA
- North Norfolk Coast Ramsar site
- Outer Thames Estuary SPA
- Sandlings SPA
- Southern North Sea SAC
- The Wash and North Norfolk Coast SAC

The Secretary of State has undertaken an AA in respect of those 15 sites' Conservation Objectives to determine whether the Project, either alone or in-combination with other plans or projects, will result in an adverse effect on integrity.

The Secretary of State has undertaken a robust assessment using all of the information available to him, including the advice from the SNCBs, the recommendations of the ExA and the views of Interested Parties, including the Applicant. Having considered all of the information available and the mitigation measures secured through the DCO and DMLs, the Secretary of State has concluded that the Project will not have an adverse effect on integrity on the relevant qualifying features of the following eleven sites:

- Breydon Water SPA
- Breydon Water Ramsar site
- Broadland SPA
- Broadland Ramsar site
- Greater Wash SPA
- Humber Estuary SAC
- North Norfolk Coast SPA
- North Norfolk Coast Ramsar site
- Sandlings SPA
- Southern North Sea SAC
- The Wash and North Norfolk Coast SAC

However, the Secretary of State cannot rule out an adverse effect on integrity beyond reasonable scientific doubt in relation to the following four sites:

## East Anglia One North Habitats Regulations Assessment

- In-combination impacts on lesser-black backed gull from collision mortality, a qualifying feature of the Alde-Ore Estuary SPA and Ramsar site;
- In-combination impacts on kittiwake from collision mortality, a qualifying feature of the Flamborough and Filey Coast SPA; and
- In-combination impacts on red-throated diver from displacement/ disturbance, a qualifying feature of the Outer Thames Estuary SPA.

The Secretary of State concludes that the Project does not meet the integrity test and that the further tests set out in the Habitats Regulations must be applied. These include an assessment of alternative solutions, Imperative Reasons of Overriding Public Interest (IROPI) and environmental compensation.

Further consideration of information provided to inform these further tests is presented in Section 9 to Section 11.

## 7. Transboundary Assessment

Given the potential for this Project to affect mobile features across a wide geographical area; the Secretary of State believes it important to consider the potential impacts on protected sites in other European Economic Area (EEA) states, known as transboundary sites, in further detail. The ExA also considered the implications for these sites, in the context of looking at the wider EIA considerations. The results of the ExA's considerations and the Secretary of State's own views on this matter are presented below.

In June 2018, during the pre-application stage, the Planning Inspectorate undertook a transboundary screening and consultation on behalf of the Secretary of State [OD-001] pursuant under Regulation 32 of the 2017 EIA Regulations and the United Nations Environment Programme Convention on Biological Diversity 1992. A second screening was carried out in December 2019 and a third was carried out in March 2021.

Transboundary consultation responses were received from:

- Denmark [OD-003], which provided no comments;
- France [OD-004], which expressed a wish to participate, but from whom no further contributions were received;
- The Netherlands [OD-005], which asked to be informed of progress and a RR was received from the state entity Rijkswaterstaat [RR-066] and considered within the Examination; and
- Sweden [OD-006], which sought an extension of time, but from whom no further contributions were received.

Potential transboundary impacts were considered in the HRA Report with several protected sites taken forward to the shadow AA.

The RR from Rijkswaterstaat raised ornithological matters that in the opinion of the Applicant were subsequently agreed upon [REP1-054]. The conclusions of no significant effects on the ornithological receptors discussed was not contested in Rijkswaterstaat's responses to the ExA's questions. On this basis, the ExA concluded that there were no outstanding transboundary matters for consideration, whether arising from RRs or from transboundary consultation responses received up to the point of submission.

The Secretary of State agrees with the ExA on this matter. The Secretary of State has not been presented with any substantive evidence to demonstrate that transboundary impacts would have a likely significant effect. As such, the Secretary of State is satisfied that the Project, either alone or in-combination with other plans or projects would not have a likely significant effect on any transboundary protected site.

## 8. Consideration of the Case for Derogation

Based on the AA the Secretary of State cannot conclude within reasonable scientific doubt, the absence of an adverse effect from the Project, in-combination with other projects, on the integrity of the Flamborough and Filey Coast SPA with respect to the kittiwake feature; the lesser black-backed gull feature of Alde-Ore Estuary SPA and Ramsar; and for the Project alone and in-combination with other projects on the red-throated diver feature of the Outer Thames Estuary SPA.

The Secretary of State has therefore reviewed the Project in the context of Regulations 64 and 68 of the Habitats Regulations and Regulations 29 and 36 of the Offshore Habitats Regulations to determine whether the Project can be consented. References to Regulations 29 and 36 below should be read as references to Regulations 64 and 68, if applicable.

Regulation 29 allows for the consenting of a project that is required for imperative reasons of overriding public interest (IROPI), even though it would cause a negative adverse effect on the integrity of a protected site.

Consent may only be given under Regulation 29 where no alternative solutions to the project are available which are less damaging to the affected protected site and where Regulation 36 is satisfied.

Regulation 36 requires the appropriate authority to secure any necessary compensatory measures to ensure that the overall coherence of the UK's national site network is protected.

In accordance with guidance on the application of HRA published by the Planning Inspectorate (Advice Note 10)<sup>72</sup> and Defra (2021)<sup>73</sup>, this part of the Project review has followed a sequential process whereby:

- Alternative solutions to the Project have been considered;
- Consideration has been given to whether there are IROPI for the Project to proceed; and
- Compensation measures proposed by the Applicant for ensuring that the overall coherence of the UK's national site network is protected have been assessed.

<sup>72</sup> The Planning Inspectorate (2017): *Advice Note Ten: Habitats Regulations Assessment Relevant to Nationally Significant Infrastructure Projects*.

<sup>73</sup> <https://www.gov.uk/guidance/habitats-regulations-assessments-protecting-a-european-site>

## 9. Alternative Solutions

The Secretary of State has given regard to the objectives of the Project as described by the Applicant and has considered how these objectives could be met by alternative means.

### 9.1.1. Project Objectives

The Applicant's identification of need for the Proposed Development and its contribution within the UK's broader carbon reduction strategy is set out in Chapter 2 of the ES [APP-050].

The Applicant identified the following drivers which underpin the need for renewable energy which would be addressed by the Project:

- Reducing greenhouse gas emissions;
- Increasing energy generation from low carbon sources to replace high carbon energy sources such as coal and gas;
- Increasing energy security of supply for the UK market, including:
- Securing safe, affordable, reliable energy, preferably generated in the UK; and
- Replacing existing ageing energy generation infrastructure;
- Meeting expected electricity demand whilst meeting climate change commitments;
- Maximising social and economic opportunities for the UK from energy infrastructure investment (responded to the Clean Growth Strategy (DBEIS 2017) and the UK "Offshore Wind Sector Deal" (DBEIS 2019); and
- Increasing the UK's offshore wind capacity to 30GW by 2030.

Noting the emergence of additional drivers between the drafting of the ES and Examination period, The Applicant updated its positions on relevant policy at ISH2 [REP3-085] to highlight the substantial extent to which new and emerging targets have reinforced the need case set out in NPS EN-1.

The contribution to reducing CO<sub>2</sub> emissions to mitigate climate change and of achieving net zero emissions in the UK by 2050 was supported by the great majority of IPs. However, IPs were concerned that the Applicant had not sought to adapt the transmissions connection onshore to meet concerns emerging from the BEIS Offshore Transmission Review, that proposed offshore developments might develop innovative 'pathfinder' approaches to transmission connection design and development.

The ExA concluded that the Project should be assessed under the current policy framework, because at the end of the Examination period the current policy framework comprised NPS EN-1, NPS EN-3 and NPS EN-5, and the outcomes from the BEIS Offshore Transmission Network Review had not been finalised.



Having regard to the suite of objectives identified by the Applicant in the context of National Policy Statements on energy (EN-1), renewable energy infrastructure (EN-3) and electricity networks infrastructure (EN-5), the Secretary of State considers the primary objectives of the Project to be:

- To generate low carbon electricity from an offshore wind farm in support of the decarbonisation of the UK electricity supply.
- To export electricity to the UK National Grid to support UK commitments for offshore wind generation and security of supply.

Beyond this, many of the Applicant's objectives for the Project are necessarily set within the UK Government's mechanisms for promoting the development of offshore wind, notably the granting of leases by The Crown Estate for areas of the seabed to be developed, and the purchase of low carbon electricity through Contracts for Difference<sup>74</sup>.

In his assessment of alternatives, the Secretary of State has not constrained himself solely to those alternatives that could be delivered by the Applicant. Nevertheless, the Secretary of State acknowledges that any alternative must be economically feasible for a developer and allow a developer to fulfil the terms of its lease with The Crown Estate.

### 9.1.2. Identification of Alternatives

In accordance with guidance published by Defra, the Secretary of State does not consider that alternative forms of energy generation meet the objectives for the Project. Alternatives to the Project considered by the Secretary of State are consequently limited either to Do Nothing or to alternative wind farm projects. Alternative types of wind farm projects considered are:

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

### 9.1.3. Consideration of Alternatives

#### 9.1.3.1. *Do Nothing*

Not proceeding with the Project would remove the risk of direct impacts to ornithology features but in HRA terms 'do nothing' would fail to meet the objectives of the Project and is not considered an alternative solution.

The ExA concluded, in line with Defra 2012 guidance, that only other offshore wind projects should be considered, as alternative types of energy generation do not meet the objectives of the Project. Furthermore, other windfarm projects do not represent an alternative solution as all available projects are required in order to meet the targets for renewable energy within the UK.

#### 9.1.3.2. *Offshore Wind Farms Not in UK EEZ*

The Secretary of State considers offshore wind farm projects that are located outside UK territorial waters are not an alternative to the Project since this would not meet the objective to support the decarbonisation of the UK electricity supply and UK commitments on offshore wind generation.

<sup>74</sup> <https://www.gov.uk/government/collections/electricity-market-reform-contracts-for-difference>.

Although the UK is party to international treaties and conventions in relation to climate change and renewable energy, according to the principle of subsidiarity and its legally binding commitments under those treaties and conventions, the UK has its own specific legal obligations and targets in relation to carbon emission reductions and renewable energy generation. Other international and EU countries similarly have their own (different) binding targets. Sites outside the UK are required for other countries to achieve their own respective targets in respect of climate change and renewable energy.

### 9.1.3.3. *Alternative Locations within the UK*

The site selection for all offshore wind proposals in the UK is controlled by The Crown Estate leasing process. Sites not within the areas identified by The Crown Estate leasing process or outside of that which the Applicant has secured (the southern East Anglia Zone) are not legally available, and therefore do not represent alternative locations.

The Applicant's Derogations Case [REP12-059] provides information on the site selection process within the southern East Anglia Zone. This identified offshore Project site and the East Anglia Two project site as the most suitable remaining sites. As there is a requirement for both projects, the East Anglia Two project site does not represent a feasible alternative location.

The ExA concluded that no alternative locations or sites exist for the offshore wind farm array that would present a feasible alternative solution. No IPs raised this matter in regard to proposed offshore infrastructure during the Examination.

### 9.1.3.4. *Alternative Designs*

Changes to the Project design were made during the Examination to mitigate potential adverse effects on the qualifying features of SPAs. The minimum air-draught height of the turbines was increased from 22m to 24m as mitigation for adverse effects arising from collision risk (in relation to the qualifying features of Flamborough and Filey Coast SPA and Alde-Ore Estuary SPA). Furthermore, a 2 km buffer was included between the proposed order limits and the boundary of the Outer Thames Estuary SPA, to mitigate for the effects upon red-throated diver disturbance and displacement. These changes were incorporated into the Project parameters as secured in the recommended Development Consent Order (rDCO).

The Applicant's derogations case [REP12-059] explored project-level further alternative designs: however, the Applicant concluded that alternative scales or designs that would reduce capacity for electricity generation would fail to meet their objectives for electricity generation.

Changes to the operation of the Project, such as turning turbines off during sensitive periods and excluding vessel transits from the Outer Thames Estuary SPA were also excluded because they would undermine the objectives for electrical capacity commercial viability.

Natural England consistently advised that increasing the buffer between the Project and the boundary of the Outer Thames Estuary SPA to 10 km would avoid an adverse effect on the integrity of the SPA [RR-059, REP6-116, REP8-167]. In its final submission [REP13-048], Natural England stated that '*We consider that there remains some doubt that the Applicant had satisfactorily demonstrated that the 'alternatives test' has been met as regards reducing impacts on the Outer Thames Estuary SPA for impacts on red-throated diver*'. The Applicant maintained that no alternatives to the proposed design parameters would be feasible [REP12-059].

### 9.1.4. Conclusion on Alternatives

The ExA considered information on alternatives submitted by the Applicant and other interested parties. It considered it to be reasonable to focus on other potential sites for offshore wind energy and was satisfied that alternative sites had been properly considered.

With regards to alternative designs, and being mindful that the design parameters provided during the examination may have changed, the Secretary of State (on 2<sup>nd</sup> November 2021) requested details of any increases to the turbine draught height, that were not included at the time of the application or during the Examination, which could avoid or reduce adverse effects on the lesser black-backed gull feature of Alde-Ore Estuary SPA and the kittiwake feature of Flamborough and Filey Coast SPA<sup>1</sup>. In their 30<sup>th</sup> November 2021 response, the Applicant confirmed that it had not made any further increases to the turbine draught height commitment of 24m above MHWS secured within the final draft DCO<sup>75</sup>.

Furthermore, in relation to the red-throated diver feature of the Outer Thames Estuary SPA, in order to explore the potential for alternative design parameters the Secretary of State (20<sup>th</sup> December 2021) requested that the Applicant, in consultation with Natural England, provide an updated project layout that included a sufficient buffer between the array and the SPA boundary to remove displacement impacts on red-throated divers within the SPA<sup>2</sup>. In their 31<sup>st</sup> January 2022 response<sup>76</sup>, the Applicant provided details of three layouts including: the existing layout, which included a 2km buffer between the site boundary and the SPA; an updated layout with a 6.5km buffer; and an updated layout with an 8km buffer, however neither of these alternative designs reduce the Project impacts to such an extent that a conclusion of no adverse effect on integrity could be reached as the Project would still be located within 10km of the SPA.

The Applicant also confirmed that larger buffers would have a significant impact on the Project's deliverable capacity, reducing the contribution the Project would make toward the UK Government's policy targets for offshore wind generation deployment. The corresponding reductions in installed capacity for the 6.5 km buffer would be 24.19% and for the 8km buffer, 33.87%.

Natural England confirmed that a minimum of a 10km buffer between the array and the SPA would be required to remove the displacement effects on red-throated diver<sup>77</sup>. The Applicant subsequently stated that for a 10km buffer the reduction in installed capacity would be 50%

The Applicant wrote to the Secretary of State on 16<sup>th</sup> March 2022<sup>78</sup> to clarify its position that that any buffer beyond 2km is not a feasible alternative because it would reduce the project capacity and would therefore no longer meet the project objectives. The Applicant supported this position with reference to two pieces of Defra guidance: Defra's 2012 guidance on the application of article 6(4)<sup>79</sup> states: "Alternative solutions are limited to those which would deliver the same overall objective as the original proposal." Defra's draft 2020 guidance for developing compensatory measures in relation to Marine Protected Areas<sup>80</sup> (MPAs) states that "Alternative solutions or other means of proceeding should be

<sup>75</sup> Scottish Power Renewables (2021): *East Anglia One North and East Anglia Two Offshore Windfarms: Applicants' Response to the Secretary of State's Questions of 2<sup>nd</sup> November 2021 (Items 4-7)*. Dated 30<sup>th</sup> November 2021.

<sup>76</sup> Scottish Power Renewables (2022): *East Anglia One North and East Anglia Two Offshore Windfarms: Applicants' Response to the Secretary of State's Questions of 20<sup>th</sup> December 2021 (Item 5)*. Dated 31<sup>st</sup> January 2022.

<sup>77</sup> Natural England (2022): *Reference Case: 10571 Consultation: 379437*. Dated 31<sup>st</sup> January 2022.

<sup>78</sup> Scottish Power Renewables (2022): *East Anglia ONE North Clarifications in Relation to Natural England's Letter Dated 15<sup>th</sup> March 2022*. Dated 16<sup>th</sup> March 2022.

<sup>79</sup> <https://www.gov.uk/government/publications/habitats-and-wild-birds-directives-guidance-on-the-application-of-article-6-4>

<sup>80</sup> [https://consult.defra.gov.uk/marine-planning-licensing-team/mpa-compensation-guidance-consultation/supporting\\_documents/mpacompensatorymeasuresbestpracticeguidance.pdf](https://consult.defra.gov.uk/marine-planning-licensing-team/mpa-compensation-guidance-consultation/supporting_documents/mpacompensatorymeasuresbestpracticeguidance.pdf)

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limited to those which would deliver the same overall outcome for the activity whilst creating a substantially lower risk of impact to the MPA.” The Applicant also clarified that a Project beyond 8km would not be viable.

Following a review of the information submitted by the Applicant and Natural England, the Secretary of State considers that whilst a larger buffer distance between the Outer Thames Estuary SPA and Project array would reduce (>2km and <10km) or avoid (>10km) the adverse effect on integrity of the SPA from disturbance and displacement effects upon the red-throated diver feature, any increase in distance between the Project array and the SPA could reduce the generation capacity of the Project and would therefore not meet Project objectives and would not satisfy the alternatives test.

The Secretary of State therefore concludes that alternative solutions are not available that would meet Project objectives, and IROPI must be considered.

## 10. Imperative Reasons of Overriding Public Interest

The HRA Derogation Provisions provide that a project having an adverse effect on integrity on a protected site may proceed (subject to a positive conclusion on alternatives and provision of any necessary compensation) if there are IROPI.

This section of the HRA determines whether there are IROPI for the Project to proceed subject to adequate compensatory measures being implemented.

The HRA Derogation Provisions identify certain in-principle grounds of IROPI that may be advanced in favour of such a project. Where the site concerned hosts a priority natural habitat or a priority species, grounds for IROPI should include human health, public safety or beneficial consequences of primary importance to the environment but otherwise may be of a social or economic nature.

The parameters of IROPI are explored in guidance provided by Defra<sup>81</sup> and the European Commission<sup>82</sup>, which identify the following principles:

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

The Secretary of State is satisfied that there are imperative reasons of overriding public interest for the Project to proceed subject to adequate compensatory measures being implemented. In arriving at his decision, the Secretary of State has reviewed how the Project provides a public benefit which is essential and urgent despite the harm to the integrity of the kittiwake feature of the Flamborough and Filey Coast SPA; and the lesser black-backed gull feature of Alde-Ore Estuary SPA and Ramsar; and the red-throated diver feature of the Outer Thames Estuary SPA.

The decision is predicated by the principal and essential benefit of the Project as a significant contribution to limiting the extent of climate change in accordance with the objectives of the Paris Agreement. The consequences of not achieving those objectives would be severely detrimental to societies across the globe, including the UK, to human health, to social and economic interests and to the environment.

<sup>81</sup> [https://consult.defra.gov.uk/marine-planning-licensing-team/mpa-compensation-guidance-consultation/supporting\\_documents/mpacompensatorymeasuresbestpracticeguidance.pdf](https://consult.defra.gov.uk/marine-planning-licensing-team/mpa-compensation-guidance-consultation/supporting_documents/mpacompensatorymeasuresbestpracticeguidance.pdf)

<sup>82</sup> [https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/EN\\_art\\_6\\_guide\\_jun\\_2019.pdf](https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/EN_art_6_guide_jun_2019.pdf)



The need to address climate change is the principal tenet behind the Climate Change Act 2008 (“2008 Act”), and subsequently published National Policy Statements for energy (EN-1)<sup>83</sup>, renewable energy infrastructure (EN-3)<sup>84</sup> and electricity networks (EN-5)<sup>85</sup> provide a framework for delivering the UK’s international commitments on climate change.

Measures set out in the NPSs have been given further impetus to reflect evolving understanding of the urgency of actions to combat climate change, including a commitment to reduce greenhouse gas emissions to net zero by 2050, which is now reflected in domestic law through amendments to the 2008 Act.

The Government’s strategy for decarbonisation to achieve this commitment relies on contributions from all sectors delivered through multiple individual projects implemented by the private sector. The Government has also set up schemes to facilitate the deployment of such projects and to provide the public with value for money, such as via the Contracts for Difference scheme.

The Government anticipates that decarbonisation will lead to a substantially increased demand for electricity as other power sources are at least partially phased out or transformed and other sectors, such as heat and transport, electrify. Government has committed to no longer use coal to generate electricity from 1 October 2024<sup>86</sup>.

The UK has also committed to decarbonise the electricity system by 2035, subject to security of supply, focusing on ‘home-grown technologies’<sup>87</sup>. This will require the establishment of a reliable and secure mix of low-carbon electricity sources, including large-scale development of offshore wind generation. The scale of the contribution of offshore wind to the electricity supply mix is reflected in the targets set by the Government for 40 GW of offshore wind by 2030.

Offshore wind generation schemes can only be developed through the mechanism put in place by The Crown Estate for leasing areas of the seabed in a structured and timely way. Projects which make a significant contribution to meeting the target capacity in the timeframe required are therefore both necessary and urgent.

These considerations are expanded on in the following section.

Additional, subsidiary beneficial consequences of primary importance to the environment, to human health, and social and economic benefits from the Project are noted but are not deemed essential.

### 10.1.1. The National Policy Statements (NPSs)

#### 10.1.1.1. Establishing the Basis Provided by the 2011 NPSs

The NPSs were established against obligations made as part of the Climate Change Act 2008 (‘CCA2008’). The overarching National Policy Statement for Energy (NPS EN-1) sets out national policy for energy infrastructure in Great Britain (GB). It has effect, in combination with NPS EN-3 (for renewable energy infrastructure) and NPS EN-5 (for electricity networks), on recommendations made by the Planning Inspectorate (‘PINS’) to the Secretary of State for BEIS on applications for energy developments

<sup>83</sup> Department of Energy & Climate Change. *Overarching National Policy Statement for Energy (EN-1)*. TSO, 2011.

<sup>84</sup> Department of Energy & Climate Change. *National Policy Statement for Renewable Energy Infrastructure (EN-3)*. TSO, 2011.

<sup>85</sup> Department of Energy & Climate Change. *National Policy Statement for Electricity Networks Infrastructure (EN-5)*. TSO, 2011.

<sup>86</sup> [www.gov.uk/government/news/end-to-coal-power-brought-forward-to-october-2024](https://www.gov.uk/government/news/end-to-coal-power-brought-forward-to-october-2024)

<sup>87</sup> <https://www.gov.uk/government/news/plans-unveiled-to-decarbonise-uk-power-system-by-2035>

that fall within the scope of the NPSs<sup>88</sup>. These NPSs, when combined with the relevant technology-specific energy NPS, provide the primary basis for decisions by the Secretary of State.

The NPSs set out a case for the need and urgency for new energy infrastructure to be consented and built with the objective of supporting the Government's policies on sustainable development, in particular by:

- Mitigating and adapting to climate change, and
- Contributing to a secure, diverse and affordable energy supply<sup>89</sup>.

The NPS for renewable energy infrastructure covers those technologies which, at the time of publication in 2011, were technically viable at generation capacities of over 50 MW onshore and 100 MW offshore. This includes offshore wind, and as such the need for this technology is fully covered by the NPS.

The Energy White Paper, *Powering Our Net Zero Future*, was published on 14 December 2020. It announced a review of the suite of energy National Policy Statements but confirmed that the current National Policy Statements were not being suspended in the meantime. The 2011 energy National Policy Statements therefore remain the basis of the Secretary of State's consideration of the Application.

The arguments which support a national need for low-carbon infrastructure made today are consistent with those arguments contained in the NPSs, and indeed the Secretary of State is of the view that the NPSs clearly set out the specific planning policies which the Government believes both respect the principles of sustainable development and are capable of facilitating the consenting of energy infrastructure on the scale and of the kinds necessary to help us maintain, safe, secure, affordable and increasingly low carbon supplies of energy.

The NPSs set out the national case and establish the need for certain types of infrastructure, as well as identifying potential key issues that should be considered by the decision maker. S104 of the Planning Act (2008)<sup>90</sup> makes clear that where an NPS exists relating to the development type applied for, the Secretary of State must have regard to it. The NPSs provide specific policy in relation to offshore wind development, and the policies set out in NPS EN-1, EN-3 and EN-5 therefore apply.

This national need relates both to the decarbonisation of the electricity supply within the required timeframe and to the risk the decarbonisation programme could pose to the security of electricity supply as more traditional generating stations are decommissioned.

With regard to the latter, the Secretary of State notes the ruling in case C-411/17 by the European Court of Justice<sup>91</sup> that the objective of ensuring the security of the electricity supply constitutes an IROPI.

### *10.1.1.2. A Synthesis of the 2011 National Policy Statements EN-1 and EN-3*

At the time the NPSs were published, scientific opinion was that, to avoid the most dangerous impacts of climate change, the increase in average global temperatures must be kept to no more than 2°C. Global emissions must therefore start falling as a matter of urgency<sup>92</sup>.

The energy NPSs were intended to speed up the transition to a low carbon economy and help the UK to realise its climate change commitments sooner than would a continuation under the current planning

<sup>88</sup> NPS EN-1 Para 1.1.1

<sup>89</sup> NPS EN-3 Para 1.3.1

<sup>90</sup> <http://www.legislation.gov.uk/ukpga/2008/29/contents>.

<sup>91</sup> Judgement of 29. 7. 2019 – Case C-411/17 *Inter-Environnement Wallonie and Bond Beter Leefmilieu Vlaanderen*. ECLI:EU:2019;622.

<sup>92</sup> NPS EN-1 Para 2.2.8

system<sup>93</sup>. They recognise that moving to a secure, low carbon energy system to enable the UK to meet its legally binding target to cut greenhouse gas emissions by at least 80% by 2050, compared to 1990 levels, is challenging, but achievable. This would require major investment in new technologies to electrify heating, industry and transport, and cleaner power generation<sup>94</sup>. Under some 2050 pathways, electricity generation would need to be virtually emission-free, because emissions from other sectors were expected still to persist<sup>95</sup>. Consequentially, the need to electrify large parts of the industrial and domestic heat and transport sectors could double electricity demand by 2050<sup>96</sup>.

The NPSs conclude that the UK needs sufficient electricity capacity from a diverse mix of technologies and fuels<sup>97</sup>, and therefore the UK also needs all the types of energy infrastructure covered by the NPSs to achieve energy security at the same time as dramatically reducing greenhouse gas emissions<sup>98</sup>. Thus, all applications for development consent for the types of infrastructure covered by the energy NPSs should be assessed on the basis that the Government has demonstrated that there is a need for those types of infrastructure and that the scale and urgency of that need is as described within EN-1 Part 3. Substantial weight should therefore be given to the contribution which projects would make towards satisfying this need for a secure, low carbon, electricity supply when considering applications for development consent under the Planning Act 2008<sup>99,100</sup>. The economic feasibility of harvesting sufficient available natural resource will be an important driver for proposed locations of renewable energy projects<sup>101</sup>.

To hit the target of UK commitments to largely decarbonise the power sector by 2030, the NPSs conclude that it is necessary to bring forward new renewable electricity generating projects as soon as possible. The need for new renewable electricity generation projects is therefore urgent.

The NPS expected offshore wind farms to make up a significant proportion of the UK's renewable energy generating capacity up to 2020 and towards 2050<sup>102</sup>.

### 10.1.2. The United Kingdom has a Legal Commitment to Decarbonise

This section sets out the obligations of the 2008 Act, against which the NPSs (2011) were established. It then outlines the UK's 2019 legally binding commitment to achieving 'Net-Zero' carbon emissions by 2050, against which the need for future electricity generation developments should be assessed.

<sup>93</sup> NPS EN-1 Para 11.7.2

<sup>94</sup> NPS EN-1 Para 2.2.1

<sup>95</sup> NPS EN-1 Para 2.2.6

<sup>96</sup> NPS EN-1 Para 2.2.22

<sup>97</sup> NPS EN-1 Para 2.2.20

<sup>98</sup> NPS EN-1 Para 3.1.1

<sup>99</sup> NPS EN-1 Para 3.1.3

<sup>100</sup> NPS EN-1 Para 3.1.4

<sup>101</sup> NPS EN-3, Para 2.6.57

<sup>102</sup> NPS EN-3 Para 2.6.1

### 10.1.2.1. Climate Change Act 2008

The Government, through the 2008 Act, set legally binding carbon targets for the UK<sup>103</sup>, aiming to cut emissions (versus 1990 baselines) by 34% by 2020 and at least 80% by 2050, 'through investment in energy efficiency and clean energy technologies such as renewables, nuclear and carbon capture and storage'<sup>104</sup>.

The 2008 Act is underpinned by further legislation and policy measures. Many of these have been consolidated in the UK Low Carbon Transition Plan ('LCTP')<sup>105</sup>, and UK Clean Growth Strategy<sup>106</sup>. A statutory body, the Committee on Climate Change ('CCC'), was also created by the 2008 Act, to advise the UK and devolved Governments and Parliaments on tackling and preparing for climate change, and to advise on setting carbon budgets. The CCC report regularly to the Parliaments and Assemblies on the progress made in reducing greenhouse gas emissions. The UK government has set five-yearly carbon budgets which currently run until 2032.

### 10.1.2.2. Enhancements of Existing UK Government Policy on Climate Change: Net-Zero

The UK context for the need for greater capacities of low-carbon UK generation to come forward with pace, has continued to develop. In October 2018, following the adoption by the UN Framework Convention on Climate Change of the Paris Agreement, the Intergovernmental Panel on Climate Change ('IPCC') published a 'Special Report on the impacts of global warming of 1.5°C above pre-industrial levels'. This report concludes that human-induced warming had already reached approximately 1°C above preindustrial levels, and that without a significant and rapid decline in emissions across all sectors, global warming would not be likely to be contained, and therefore more urgent international action is required.

In response, in May 2019, the CCC published their report called: 'Net-Zero: The UK's contribution to stopping global warming.' This report recommended that government extend the ambition of the 2008 Act past the delivery of net UK greenhouse gas savings of 80% from 1990 levels, by 2050. The CCC recommend that *'The UK should set and vigorously pursue an ambitious target to reduce greenhouse gas emissions (GHGs) to 'Net-Zero' by 2050, ending the UK's contribution to global warming within 30 years.'* The CCC believe that this recommendation is *'necessary [against the context of international scientific studies], feasible [in that the technology to deliver the recommendation already exists] and cost-effective', reporting that 'falling costs for key technologies mean that . . . renewable power (e.g., solar, wind) is now as cheap as or cheaper than fossil fuels.'* Importantly, the CCC recommendation identifies a need for low-carbon infrastructure development which is consistent with the need case set out in NPS EN1, but points to an increased urgency for action.

Since the implementation of the Climate Change Act 2008, government has set five-yearly carbon budgets. The latest of which is the sixth carbon budget (CB6) which was laid in legislation in April 2021

<sup>103</sup>

The commitment to decarbonise extends across the United Kingdom of Great Britain and Northern Ireland. Northern Ireland is interconnected with the mainland power system through interconnectors but is operated under a different electricity market framework. Therefore, hereinafter we refer to Great Britain ('GB') in relation to electricity generation and transmission, and the UK, to refer to the nation which has legally committed itself to Net-Zero carbon emissions by 2050

Northern Ireland is interconnected with the mainland power system through interconnectors but operated under a different electricity market framework. Therefore, hereinafter we refer to Great Britain in relation to electricity generation and transmission, and the UK, to refer to the nation which has legally committed itself to Net-Zero carbon emissions by 2050.

<sup>104</sup> HM Government. *The UK Low Carbon Transition Plan*. HMSO, 2009. Five Point Plan.

<sup>105</sup> HM Government. *The UK Low Carbon Transition Plan*. HMSO, 2009. Five Point Plan.

<sup>106</sup> BEIS (2018). *The Clean Growth Strategy*. HMG, 2017 (Corrected 2018).

and commits to cutting greenhouse gas emissions by 78% by 2035, compared to 1990 level, in line with the CCC recommendation. The sixth carbon budget spans from 2033-2037.

In October 2021, government published The Net Zero Strategy: Build back Greener. It is a cross-economy strategy which sets out the measures to keep us on our path to net zero, including the action we will take to keep us on track for meeting carbon budgets and our 2030 Nationally Determined Contribution. We set in the Net Zero Strategy that to meet the level of decarbonisation that CB6 requires and simultaneously cater to a 40-60% increase in electricity demand. This presents a substantial challenge and could require having to build out all currently known low carbon technologies in the power sector at or close to their maximum technical limits by 2035.

In March 2019 the Government announced its ambition to deliver at least 30 GW of offshore wind by 2030, as part of the Offshore Wind Sector Deal (the 'Sector Deal')<sup>107</sup>. The Sector Deal reinforces the aims of the UK's Industrial Strategy and Clean Growth Strategy, which seeks to maximise the advantages for UK industry from the global shift to clean growth, and in particular: 'The deal will drive the transformation of offshore wind generation, making it an integral part of a low-cost, low-carbon, flexible grid system.' Within supplementary documents to the Queens Speech, December 2019<sup>108</sup>, Government committed to increase their ambition on offshore wind to 40 GW by 2030.

In June 2019 the Government amended the 2008 Act to implement the CCC's recommendation. This made the UK the first major economy to pass laws requiring it to end its contribution to global warming by 2050.

At the end of 2020 GB had 10,415MW of operational offshore wind<sup>109</sup> with 9,823MW in construction or soon to start construction. There is around a further 30GW of projects in earlier stages of development.

The inclusion of a project on a 'future project pipeline' does not indicate that the project will go ahead, or if it does, at a particular generation capacity. It is therefore not the case that the ambitions of the Sector Deal, nor the newly adopted government policy, will certainly be met by those projects currently under consideration by developers. Within this context, the importance of all offshore wind projects currently under development, to the achievement of Government policy and pledges, is clear. Without the Project, it is very possible that delivery of the Sector Deal and the UK government's 2030 ambition will fall short.

In conclusion, offshore wind is recognised as being an important technology for low-carbon generation and the urgent need for large capacities of low-carbon generation is clear to avoid compromising security of electricity supply. Specifically, the Project will be a necessary part of the future generation mix, and as such will make a valuable contribution to meeting the UK Government's achievement of decarbonisation commitments as part of the legally binding target for Net Zero by 2050. On this basis the Secretary of State concludes that there are imperative reasons of overriding public interest which justify the Project going ahead.

<sup>107</sup> BEIS (2019). *Offshore wind Sector Deal. BEIS Policy Paper, 2019.*

<sup>108</sup> HM Government, The Queen's Speech 2019 – background briefing notes.  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/853886/Queens\\_Speech\\_December\\_2019\\_-\\_background\\_briefing\\_notes.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/853886/Queens_Speech_December_2019_-_background_briefing_notes.pdf), 2019 p116

<sup>109</sup> Offshore Wind Operational Report 2020, The Crown Estate,  
<https://www.thecrownestate.co.uk/media/3792/offshore-wind-operational-report-1.pdf>



## 11. Proposed Compensatory Measures

The Applicant submitted an Offshore Ornithology Without Prejudice Compensatory Measures report<sup>110</sup>110. The compensatory measures would be secured through Schedule 18 of the Applicant's final dDCO [REP12-013].

### 11.1. Summary of Proposed Compensation Measures

The Applicant presented a range of potential compensation measures for SPA seabird populations, which are summarised below:

#### 11.1.1. Flamborough and Filey Coast SPA

To compensate for the loss of breeding kittiwake, the Applicant proposed to install an artificial nesting structure at a suitable location to increase the productivity of the southern North Sea kittiwake population. The Applicant proposed to add nest sites for kittiwakes to existing onshore artificial colonies (e.g., at Lowestoft and/ or River Tyne) through collaborative working with other OWF developers.

A steering group (comprising relevant stakeholders) would be appointed to inform the development of the final compensation strategy, as well as to oversee the implementation, monitoring and reporting of the compensation measures.

The success of the compensation measures would be monitored, and adaptive management measures adopted where required. The nesting structure(s) would remain in place and be maintained until the later of (i) the decommissioning of the windfarm or (ii) a determination by the Secretary of State that the compensation measure is no longer required, following consultation with the relevant statutory nature conservation body.

##### 11.1.1.1. Consultation

Natural England requested more details regarding the design and implementation of the proposals for artificial nest sites for kittiwake [REP9-065]. The RSPB also commented at D4 [REP4-097] and Deadline 8 [REP8-171] that it believed insufficient evidence had been provided to give confidence that the proposals would be successful.

The Applicant stated that identification of locations, obtaining necessary rights, and implementation were considered achievable, and no further detail was considered necessary [REP10-018]. The Applicant pointed to evidence from sites at Lowestoft harbour and the River Tyne where kittiwakes had readily used artificial nest sites and there was a measurable increase in the breeding success at both colonies.

The RSPB [REP12-095] agreed with the Applicant's evidence that artificial nesting sites often had higher breeding success than natural sites, but cautioned that this observed effect did vary, and cited several artificial sites that were not colonised at all or failed to reach their design capacity. It also pointed to the need to determine whether colonisation is a result of 'new' birds or merely displacement of existing populations of birds from other sites.

<sup>110</sup> Scottish Power Renewables (2021): *East Anglia One North Offshore Windfarm: Offshore Ornithology Without Prejudice Compensation Measures*. Scottish Power Renewables. Reference ExA.AS-4.D12.V4. (June 2021).

The ExA concluded that the Applicant had explored suitable compensation measures for kittiwake and adequately justified its choice of the provision of artificial nesting sites. The Applicant cited [REP12-060] several examples of kittiwake colonies that have been established on artificial coastal structures. Furthermore, potential locations for artificial nesting sites had been provided [REP12-060].

Taking the above information into account, the ExA concluded that the use of artificial nesting sites for kittiwake was well-established and would represent an appropriate technique that, if undertaken correctly, would be likely to have a degree of success in achieving its objectives.

The ExA noted the concerns regarding the level of detail and certainty over delivery. The ExA considered that Appendix 1 of the Applicant's final version of its Offshore Ornithology Without Prejudice Compensation Measures [REP12-060] provided a reasonable assessment of the feasibility and deliverability of the proposed kittiwake compensation measures. Consequently, it was the ExA's view that the provision of artificial nesting sites for kittiwake would represent an adequate compensation measure when set in the context of the predicted impact on the kittiwake population that would arise from the Project.

Schedule 18 Part 1 of the dDCO [REP12-013] specifically referenced the setting up of a kittiwake compensation steering group (KCSG) and the production of a kittiwake implementation and monitoring plan (KIMP). The ExA was therefore satisfied with the wording of Schedule 18 Part 1 of the dDCO [REP12-013], which is adopted in the rDCO, in which the kittiwake compensation measures are secured.

The ExA concluded that the proposed compensation measures for kittiwake would be appropriate, deliverable and proportionate to ensure the overall coherence of the UK National Site Network. The Secretary of State considered that the wording of the dDCO secured a possible mechanism for delivering compensation measures, but there was insufficient detail in the evidence presented to provide confidence that a package of measures could be delivered which would protect the coherence of national site network as required by Regulations 29 and 36 of the Offshore Habitats Regulations.

### 11.1.2. Alde-Ore Estuary SPA

To compensate for losses of breeding lesser black-backed gull, the Applicant proposed the installation of 'New Zealand' style fencing to exclude mammalian predators from c.4 ha of land at Orford Ness. The compensation may be undertaken in collaboration with other developers. Habitat management would be undertaken within the fenced area to provide suitable nesting conditions for lesser black-backed gulls and increase the productivity of the SPA population.

Management and monitoring would include regular checks of the fence integrity, and habitat management measures to maintain suitable nesting habitat. Furthermore, the breeding population within the enclosure will be monitored. If initial take up of the nesting opportunities is slow then adaptive management measures, such as playback of calls and use of decoys may be considered to attract birds to the site.

#### 11.1.2.1. Consultation

Natural England agreed that fencing to exclude predators was an acceptable measure to compensate for impacts on lesser black-backed gull [REP7-071]. The RSPB agreed that this may be possible, but considered this measure was unlikely to be sufficient in isolation [REP8-171].

The RSPB advised that predator exclusion could not be considered additional to necessary site management [REP4-097, REP8-171], a view not supported by Natural England [REP9-065]. The ExA asked the RSPB in ExQ2.2.10 [PD-030] to provide more detail on the delivery of this measure as part of site management: however, the RSPB did not respond.

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The Applicant [REP12-061] stated that under Schedule 18 the detailed designs of any measures would have to be “appropriate ecologically and likely to support successful compensation” and would therefore take account of the condition of the site and its existing management.

The ExA concluded that the lesser black-backed gull colony of the Alde-Ore Estuary SPA is subject to high levels of egg and chick predation, and therefore, the fencing of an area to prevent the predation of nests, particularly from foxes, would increase breeding success. Orford Ness was given as an example of a possible location where an area of ‘New Zealand’ style fencing could be erected [REP12-060]. The submitted evidence indicates that the provision of predator-proof fencing is a well-established and proven intervention that has a high likelihood of success [REP12-060].

The ExA also noted that predator-proof fencing can be costly to install and has ongoing maintenance costs. The Applicant’s cost estimate for a square of fencing with 200m sides was £80,000 to construct with annual maintenance costs of £800 [REP12-060]. The ExA considered it unlikely that such monies would be spent as part of the ongoing management at Orford Ness within the given timeframe. As such, the ExA’s concluded that this would represent an additional compensation measure rather than a general site management measure.

Schedule 18 Part 5 of the Applicant’s final dDCO [REP12-013] (now Part 2 of the DCO as made) specifically references the work of the Lesser Black-Backed Gull Compensation Steering Group (LBBCSG) in preparing the Lesser Black-Backed Gull Implementation and Monitoring Plan (LBBIMP) for submission to (and approval by) the Secretary of State, in consultation with Natural England, MMO and relevant Local Planning Authority. The ExA noted that under the provisions of Schedule 18, no wind turbine forming part of the authorised development may begin operation until the measures set out in the approved LBBIMP are implemented. Taking this together with the compensation measures document [REP12-060] which will be certified under Article 36 of the rDCO, the ExA was content that the proposed compensation measure of providing predator proof fencing for lesser black-backed gull was adequately secured.

The ExA considered that the secondary compensation measure of the proposals in regard to by-catch, as set out in Appendix 7 of [REP12- 060] and summarised in section 11.1.4 below, would also have the potential to be of some benefit to the lesser black-backed gull population of the SPA. Furthermore, the ExA considered that these measures were adequately secured in the rDCO via Part 5, 3(f) of Schedule 18.

The ExA concluded that the proposed compensation measures for lesser black-backed gull were appropriate, deliverable and proportionate compensation for the adverse effect on the integrity of Alde-Ore Estuary SPA and to ensure the overall coherence of the UK national site network. The Secretary of State considered that the wording of the dDCO secured a possible mechanism for delivering compensation measures, but there was insufficient detail in the evidence presented to provide confidence that a package of measures could be delivered which would protect the coherence of national site network as required by Regulations 29 and 36 of the Offshore Habitats Regulations.

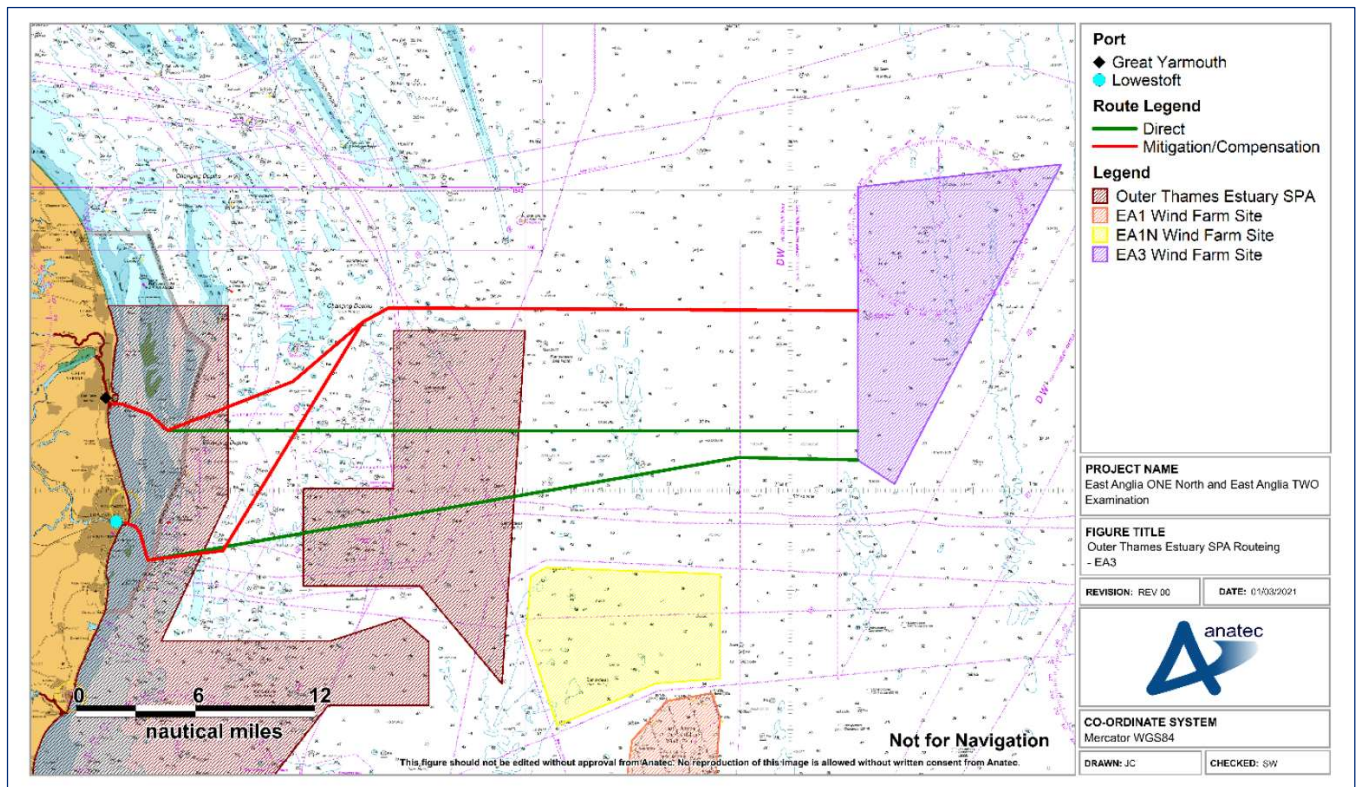
### 11.1.3. Outer Thames Estuary SPA

The Applicant initially proposed to reroute vessels to and from East Anglia Three OWF to reduce the disturbance and displacement of red-throated divers within the SPA during the non-breeding season. Figure 5 below shows the current and proposed vessel routes.

The Applicant calculated that East Anglia Three OWF operation and maintenance vessel movements will account for approximately 5% of the total annual vessel movements through the Outer Thames Estuary

SPA and the re-routing of these vessels would reduce disturbance over an area of 48km<sup>2</sup> or 80km<sup>2</sup> based on vessels being rerouted from Lowestoft and Great Yarmouth ports, respectively.

A secondary compensation measure proposed to identify suitable shipping areas (or areas from which pleasure craft could be restricted) in areas of otherwise suitable habitat for red-throated divers. Once these are identified, the Applicant would work with the relevant authorities to agree alternative routes and determine how to implement any changes.



**Figure 5: Proposed Re-routing for Vessels for East Anglia Three OWF**

### 11.1.3.1. Consultation

Natural England did not agree that the management of vessels associated with East Anglia Three OWF represented a compensation measure for displacement effects of turbines, advising that vessel management should be considered a mitigation measure and captured in the BPP for that project [REP7-071]. It also advised that vessel navigation management in relation to East Anglia Three OWF was unlikely to be sufficient, given that the magnitude of vessel impacts arising from that development was deemed at the point of decision to not result in an adverse effect on the integrity of the Outer Thames Estuary SPA [REP7-071, REP9-065]. The RSPB [REP8-171] supported this view. Natural England advised that mitigation from increasing the distance between the Project and the SPA should be implemented to avoid an adverse effect on site integrity [REP11-123].

Natural England also stated that vessels should avoid the whole of the Outer Thames Estuary SPA, not just the northern component as stated. If that is not possible due to the operational port chosen, this further limits the effectiveness of the measures.

Contrary to the conclusions reached by Natural England, the ExA concluded that the proposed re-routing of vessels associated with East Anglia Three OWF would represent an appropriate compensation measure because it would be additional to the requirements of the DCO for East Anglia Three OWF. Furthermore, the ExA stated that a reduction in vessel movements during the key breeding months could provide an



acceptable reduction in red-throated diver mortalities arising from disturbance and displacement and would alleviate the adverse effects of effective habitat loss resulting from the presence of the wind farm.

Furthermore, Schedule 18 Part 6 of the dDCO [REP12-013] (now Part 3 of the DCO as made) specifically referenced the work of the Red-Throated Diver Compensation Steering Group (RTDCSG) in preparing the Red-Throated Diver Implementation and Monitoring Plan (RTDIMP). Part 6 stipulates that the authorised development must not be commenced until a guarantee for the funding of the compensation measures has been approved and that no tower within a wind turbine may be installed until the compensation measures have been implemented. The ExA considered this necessary considering the nature of the displacement effects. Overall, the ExA considered that the approach in Schedule 18, Part 6 would provide a sufficient degree of certainty whilst also retaining sufficient flexibility to adapt to any changes arising for example as a result of monitoring.

### 11.1.4. Secondary Measures

The Applicant also proposed to undertake research into ornithological by-catch reduction and, if suitable gear types were identified that reduce by-catch, fund a voluntary fishing-gear change scheme. This would be adopted as an alternative, or in addition to the species-specific measures above.

The Applicant also considered increasing prey availability through the funding of the identification and implementation of a no take zone in the SPA, or other fisheries management measures. Such measures were discounted because there was no legal mechanism to deliver these measures at a project level.

#### 11.1.4.1. Consultation

Defra confirmed the Applicant's position that fisheries management was not an appropriate project-level measure [REP8-089].

Natural England stated the following in their Deadline 7 response (paragraph 14 and 15, REP7-071): 'Natural England acknowledges that certain mechanisms related to increasing prey availability might require a government led and/ or strategic response; however, this does not preclude the Applicant's involvement in such a response. Additionally, it is possible that there are options to increase prey availability that have not yet been fully explored, that could more easily be delivered through mechanisms that are less reliant on a government-led/ strategic response, for example buying fishing vessel licences and not using the quota.'

### 11.1.5. Additional Environmental Information

On 2<sup>nd</sup> November 2021 the Secretary of State asked the Applicant for additional environmental information on the proposed compensation measures<sup>1</sup>. In relation to the red-throated diver feature of the Outer Thames Estuary SPA, additional information was sought on the specific areas of the SPA where red-throated divers are known to be displaced by vessel movements and evidence that the Applicant could secure a reduction in vessel movements to reduce the displacement of red-throated divers in these areas.

On 30<sup>th</sup> November 2021, in response to the request for additional environmental information, the Applicant confirmed that restricting vessel movements by unrelated third parties was beyond its control and re-iterated that it could secure a reduction in vessel movements relating to the construction, operation and maintenance and decommissioning of the East Anglia Three OWF, as detailed in its Offshore Ornithology Without Prejudice Compensation Measures.



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On 20<sup>th</sup> December 2021, the Secretary of State<sup>33</sup> requested that the Applicant in consultation with Natural England provide an updated project layout that included a sufficient buffer between the array and the SPA boundary to remove displacement impacts on red-throated divers within the SPA.

On 31<sup>st</sup> January 2022, in response to the Secretary of State's request, the Applicant presented alternative project layouts with a 6.5km buffer and an 8km buffer<sup>Error! Bookmark not defined.</sup>, stating that 'A buffer of a greater distance than 8km would make the EA1N Project undeliverable due to spatial constraints', and that a buffer of 10km would reduce the generating capacity of the Project by 50%.

Natural England estimated that an 8km buffer would reduce displacement impacts on red-throated divers to 61.12km<sup>2</sup>, which represents 1.56% of the area of the SPA (compared to 156.52km<sup>2</sup> or 4.03% for a 2km buffer).

For an effective habitat loss of 61.12km<sup>2</sup> (with a buffer of 8km), the Applicant calculated that the effective area of displacement, taking into account varying magnitudes of displacement effects at different distances from the array, would be 8.38km<sup>2</sup>. This figure was calculated using a straight-line approach which assumes the 100% displacement of red-throated divers within the array, reducing to zero at the 11-12km buffer increment. This approach reflected the results of empirical studies undertaken at operational wind farms.

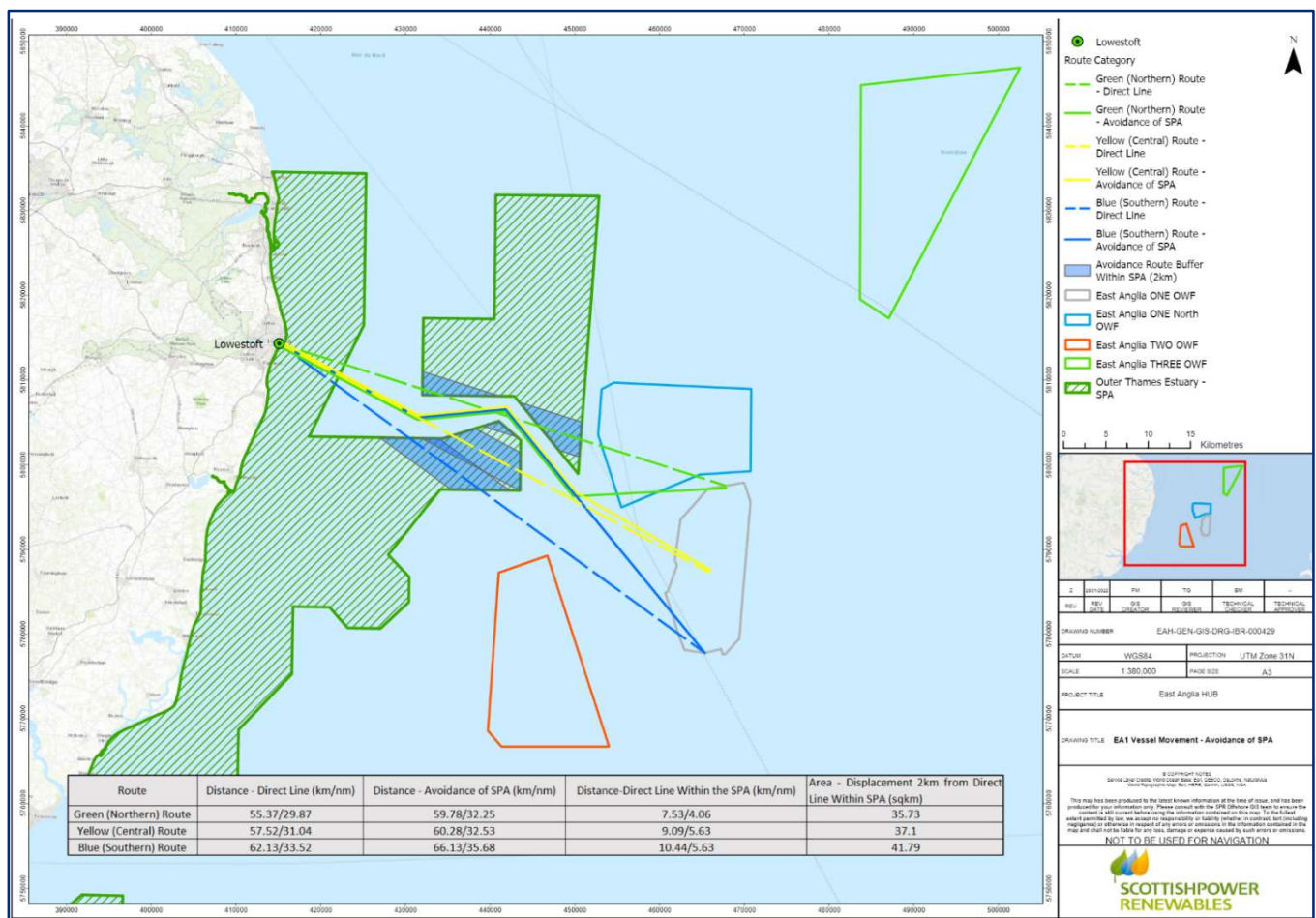
The Applicant also increased the area of compensation available by including the re-routeing of vessels from East Anglia One OWF<sup>111</sup> (see Figure 6) in addition to re-routeing vessels from East Anglia Three OWF. The Applicant calculated that if vessels from both East Anglia One OWF and East Anglia Three OWF were rerouted around the SPA, this would reduce displacement across 97.2km<sup>2</sup> of the SPA (i.e., 38.2km<sup>2</sup> from East Anglia One OWF and 59.0km<sup>2</sup> from East Anglia Three OWF). These figures equate to the area of the SPA that would be affected by daily operation and maintenance vessel transits prior to re-routeing. The Applicant asserted that the avoidance of these routes potentially provides compensation by providing access to habitat that would otherwise be avoided by red-throated divers.

Based on this estimate, the area of compensation proposed (97.2km<sup>2</sup>) represented a ratio of over 9:1 of compensation to displacement effect. This ratio is in relation to compensating for the effects of the Project at 8km from the boundary of the SPA (8.38km<sup>2</sup> of effective displacement) and the effects of the East Anglia TWO Offshore Wind Farm (1.98km<sup>2</sup> of effective displacement at 8.3km from the SPA boundary). At 6.5km this ratio was 5:1 and at 2km this ratio was 1.7:1.

The Applicant also stated that compensation measures are consistent with DEFRA's latest advice<sup>117</sup>, which refers to the 'removal of other industries' as a possible compensatory measure and notes that 'In certain cases it may be appropriate for developers to work with other regulatory bodies to secure environmental headroom for their activities'. In this case a reduction in the displacement of red-throated divers from re-routeing vessels from East Anglia One OWF and East Anglia Three OWF creates environmental headroom for the Project.

<sup>111</sup> Scottish Power Renewables (2022): *Applicants' Responses to SoS Questions 20<sup>th</sup> December 2021 (Item 5)*. Dated 31<sup>st</sup> January 2022.

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**Figure 6: Proposed Re-routing for Vessels for East Anglia One OWF**

### 11.1.5.1. Consultee Responses to the Additional Environmental Information

On 31<sup>st</sup> January 2022, Natural England<sup>112</sup> in response to the additional environmental information provided by the Applicant, questioned whether the restriction of vessel movements by third parties was actually beyond the means of the Applicant, noting that other offshore windfarm developers had made arrangements with fishers not to fish inside windfarm arrays.

With regards to the Applicants' suggested compensation measure of reducing vessel movements at East Anglia Three OWF, Natural England reiterated that this would not provide compensation for the effects on red-throated diver because periodic disturbance from transiting vessels does not equate to the persistent displacement effect exerted by a windfarm array.

Furthermore, Natural England reiterated that the impacts of the East Anglia Three OWF, including vessel movements, were not considered to represent an adverse effect on the integrity of the SPA during the determination of that project.

<sup>112</sup> Natural England (2022): Appendix 4: *Natural England's Comments on the Applicant's Response to the Outer Thames Estuary SPA in Relation to Red-Throated Diver Displacement from Vessel Movements.*

Finally, Natural England did not consider restricting movements of East Anglia Three OWF vessels would provide any benefits to the red-throated diver feature of the SPA because East Anglia Three OWF are already obliged to minimise the impacts of vessel movements through their BPP.

Natural England, having reviewed the displacement models presented by the Applicant, maintained that the displacement effects of the Project would not be removed until the array was at least 10km from the SPA. This advice was based on empirical evidence from the London Array OWF and German Bight OWF. Monitoring of these OWFs indicated that displacement effects extend to 11.5km at London Array OWF, and 10-15km at German Bight. However, Natural England considered that beyond 10km the effects were unlikely to be significant. Natural England did not comment on the updated compensation measures provided by the Applicant post-Examination.

### 11.1.5.2. Further Clarifications

The Applicant provided further clarifications on the proposed compensation measures in a letter dated 11<sup>th</sup> March 2022<sup>113</sup>. In the letter the Applicant provided further details of the proposed monitoring of wintering red-throated diver abundance and distribution before and after the construction of the Project, or the East Anglia Two OWF, depending on which was constructed first. This included a commitment to undertaking aerial digital surveys of the Outer Thames Estuary and a 10 km buffer. The results of the surveys would be used to create a new Outer Thames Estuary SPA red-throated diver displacement effect model.

Furthermore, the Applicant committed to creating and hosting a partnership of the relevant authorities and other representatives, who would identify and implement opportunities to reduce the disturbance effects on red-throated diver at a strategic level.

Finally, in accordance with advice provided by Natural England during the Examination, the Applicant committed to extending the period in which it would restrict vessel movements within the SPA to 1<sup>st</sup> November to 31<sup>st</sup> March.

### 11.1.5.3. Consultee Responses to Further Clarifications

On 15<sup>th</sup> March 2022, in response to a letter from the Secretary of State<sup>114</sup> requesting the advice of Natural England upon the Applicant's clarifications to their compensation measures, Natural England stated<sup>115</sup> that 'cognisant of the reduced impacts an 8km buffer between EA1N and the SPA would achieve, Natural England concludes that the package of measures provides a reasonable prospect of the coherence of the national site network being maintained'.

The Secretary of State notes that this advice is provided in the specific scenario of a reduction in the impacts of EA1N to 8km and EA2 to 10km and should not be taken as Natural England's advice on other permutations.

Natural England confirmed that the package of measures required included the following measures:

- Vessel re-routing of traffic associated with the operational East Anglia One OWF;
- Vessel re-routing of traffic associated with the consented East Anglia Three OWF;

<sup>113</sup> Scottish Power Renewables (2022): *East Anglia ONE North Clarifications in Relation to Matters Arising in Relation to Red-Throated Diver in the Outer Thames Estuary Special Protection Area*. Dated 11<sup>th</sup> March 2022.

<sup>114</sup> Secretary of State (2022): *Reference Case EN010077*. Dated 14<sup>th</sup> March 2022.

<sup>115</sup> Natural England (2022): *Reference Case 386093*. Dated 15<sup>th</sup> March 2022.

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- Investigation of fisheries bycatch including of red-throated diver, followed by bycatch reduction measures if a risk is identified;
- Implementation and monitoring plan (as per the 11<sup>th</sup> March 2022 clarification); and
- Creating and hosting a partnership of the relevant parties.

Natural England also considered that stakeholder engagement and liaison to raise awareness and communication of any proposed changes in usage should form part of the partnership's work programme.

Natural England confirmed that they would join the partnership and advised that the members should include the Crown Estate and Defra, but also the MMO, JNCC, statutory port authorities and other relevant regulators, relevant NGOs, other developers and sea-users.

On 16<sup>th</sup> March 2022, in response to Natural England's letter of 15<sup>th</sup> March 2022, the Applicant submitted a further letter of clarification<sup>116</sup> reiterating that a Project buffer beyond 8km would not be viable. On 24<sup>th</sup> March 2022, the Applicant submitted a further letter clarifying its 'commitment to a comprehensive suite of measures which will provide adequate compensation for impacts from EA1N at 6.5km and EA2 at 8.3km'.

The Secretary of State, having reviewed all the information, places weight on the advice of Natural England that the updated package of compensatory measures provides a reasonable prospect of the coherence of the national site network being maintained. The Secretary of State notes that Natural England support the updated package of compensatory measures with a distance of 8km between the Project and the Outer Thames Estuary SPA and a distance of 10km between the East Anglia Two OWF and the SPA with no compensation.

The Secretary of State considers that compensatory measures for red-throated diver are not sufficient to compensate for the full potential adverse effects of the Project on the SPA but are sufficient to compensate for residual effects beyond 8 km from the boundary of the SPA. This is principally because removal of periodic disturbance from transiting vessels does not equate to the persistent displacement effect exerted by a windfarm array and therefore ratios of compensation must be high to account for this discrepancy. The Secretary of State considers that, with a compensation ratio of 9:1 the shared package of compensatory measures has ecological validity and would adequately compensate for any residual effects on the red-throated diver feature of the SPA for a Project layout that includes an 8km buffer.

The Secretary of State acknowledges that whilst such a project layout does not constitute an alternative solution (given the loss in generating capacity), it is nevertheless the only project layout where he can have confidence that the package of compensatory measures will be effective.

<sup>116</sup> Scottish Power Renewables (2022): *East Anglia ONE North Clarifications in Relation to Natural England's Letter*. Dated 16<sup>th</sup> March 2022.

## 12. Conclusions

The Secretary of State concludes that the Project, alone or in-combination with other projects, would have an adverse effect on the integrity of:

- The Flamborough and Filey Coast SPA kittiwake feature;
- The Alde-Ore Estuary SPA and Ramsar lesser black-backed gull feature; and
- The Outer Thames Estuary SPA red-throated diver feature.

The Secretary of State is satisfied that there are no alternatives to fulfilling the objectives of the Project and that the Project provides a benefit that is imperative to the public interest and that the public benefits of the Project would outweigh the impacts to the Flamborough and Filey Coast SPA, Alde-Ore Estuary SPA and Ramsar, and Outer Thames Estuary SPA.

The Secretary of State is also satisfied that the necessary compensatory measures to ensure that the overall coherence of the National Site Network can be secured with regards to The Flamborough and Filey Coast SPA kittiwake feature; the Alde-Ore Estuary SPA and Ramsar lesser black-backed gull feature; and the Outer Thames Estuary SPA red-throated diver feature, when the Project includes an 8km buffer between the array and the boundary of the SPA.

### 12.1. Kittiwake Compensation

The Secretary of State considers that sufficient information has been provided to give confidence that necessary compensatory measures can be secured that will ensure the overall coherence of the National Site Network for kittiwake.

The Secretary of State notes that the Applicant's proposed compensation package, which includes the provision of artificial nesting structures at Lowestoft and/ or River Tyne, would sit within the second tier of Defra's hierarchy of compensation measures for the marine environment, i.e., it would address the "same ecological function at a different location" and provide "off-site creation, restoration or relocation of feature that will be harmed/lost"<sup>117</sup>.

The Secretary of State also agrees that the recruitment of 0.7 adult kittiwake into the southern North Sea population per year would compensate for the effects of the Project. Furthermore, the provision artificial nesting structures of sufficient size to support 100 breeding pairs, would provide enough over-compensation to address any uncertainties around this compensation measure.

The Applicant's proposed compensation measures for kittiwakes, as presented in the without prejudice compensation measure report<sup>110</sup>, will be implemented through the process described below and secured as conditions of the DCO:

- A kittiwake compensation steering group (KCSG) must be established, and the following details must be approved by the Secretary of State prior to the commencement of the authorised project:
  - i. The Terms of Reference of the KCSG.
  - ii. The membership of the KCSG.
  - iii. The schedule for meetings; the reporting and review periods; and the timetable for production of the Kittiwake Implementation and Monitoring Plan (KIMP).

<sup>117</sup> Defra (2021): *Best Practice Guidance for Developing Compensatory Measures in Relation to Marine Protected Areas*.



- iv. The dispute resolution mechanism.
- A Kittiwake Implementation and Monitoring Plan (KIMP) must be developed by the Applicant in consultation with the KCSG. The KIMP must deliver the strategy set out in the without prejudice compensation strategy and be submitted to the Secretary of State for approval (in consultation with the KCSG, the MMO, Natural England and the Local Planning Authority) within sufficient time to provide the agreed compensation measures four full breeding seasons before the operation of the first wind farm generator (see iii below). The KIMP should include the following details:
  - i. Details of the locations where compensation measures will be deployed and details of landowner agreements, demonstrating how the land will be bought/ leased, and assurances that the land management will deliver the ecology objectives of the KIMP.
  - ii. Details of design(s) of artificial nesting structures including the number of nesting structures; and how risks from avian or mammalian predation, and unauthorised human access has been designed out.
  - iii. An implementation timetable for the delivery of the artificial nest structures that ensures all compensation measures are in place in time to allow four full kittiwake breeding seasons prior to the operation of any turbine.
  - iv. Details of the proposed ongoing monitoring and reporting on the effectiveness of the measures, including: survey methods; success criteria; adaptive management measures; timescales for the monitoring and monitoring reports to be delivered; and details of the factors used to trigger alternative compensation measures and/or adaptive management measures.
  - v. Monitoring should include annual monitoring of the number of birds colonising the site including: birds prospecting; nesting attempts; egg laying; hatching; and fledging, to identify barriers to breeding success and target alternative or adaptive management measures. Evidence of natal dispersal and colony interchange with the Flamborough and Filey Coast SPA kittiwake colony should be investigated, potentially using colour-ringing of chicks.
  - vi. Details of the artificial nesting site maintenance schedule.
  - vii. Minutes from all consultations with KCSG.
- Results from the monitoring scheme must be submitted annually to the Secretary of State and Natural England. This must include details of any finding that the measures have been ineffective in securing an increase in the number of adult kittiwakes available to recruit to the SPA and, in such case, proposals to address this. Any proposals to address effectiveness must thereafter be implemented by the undertaker as approved in writing by the Secretary of State in consultation with Natural England.
- The artificial nest structures must not be decommissioned without written approval by the Secretary of State, given their role in maintaining the coherence of the National Site Network. Furthermore, they should be maintained beyond the operational lifetime of the wind farm if they are colonised. The routine and adaptive management measures, and monitoring should continue whilst the artificial nesting structures are in place.

### 12.2. Lesser Black-Backed Gull Compensation

The Secretary of State concludes that sufficient information has been provided to give confidence that necessary compensatory measures can be secured that will ensure the overall coherence of the National Site Network for lesser black-backed gull.

The Secretary of State notes that the Applicant's proposed compensation package, which includes the control of mammalian predators at Alde-Ore SPA, would sit within the highest tier of Defra's hierarchy of

compensation measures for the marine environment, i.e., it would “address same impact at same location” and provide “on-site creation, restoration or relocation of feature that will be harmed/lost”<sup>118</sup>.

The Secretary of State also agrees that the recruitment of 0.3 adult lesser black-backed gulls into the Alde-Ore Estuary SPA population per year would compensate for the effects of the Project. Furthermore, the provision of approximately 4 ha (or 40,000m<sup>2</sup>) of nesting habitat provides sufficient over-compensation in terms of the number of nesting pairs that could be supported (based on a nesting density of c.1 nest/m<sup>2</sup>) to address any uncertainties around this compensation measure.

The Applicant’s proposed compensation measures for lesser black-backed gull, as presented in the without prejudice compensation measure report<sup>110</sup>, will be implemented through the process described below and secured as conditions of the DCO:

- A Lesser Black-Backed Gull Compensation Steering Group (LBBCSG) must be established, and the following details must be approved by the Secretary of State prior to the commencement of the authorised project:
  - i. The Terms of Reference of the LBBCSG.
  - ii. The membership of the LBBCSG.
  - iii. The schedule for meetings; the reporting and review periods; and the timetable for production of Lesser Black-Backed Gull Implementation and Monitoring Plan (LBBIMP).
  - iv. The dispute resolution mechanism.
- A LBBIMP must be developed by the Applicant in consultation with LBBCSG to deliver the strategy set out in the without prejudice compensation measures. The LBBIMP must be submitted to the Secretary of State for approval (in consultation with the LBBCSG the MMO, Natural England and the Local Planning Authority) within sufficient time to provide the agreed compensation measures four full breeding seasons before the operation of the first wind farm generator (see ii below). The LBBIMP should include the following details:
  - i. Details of the locations where compensation measures will be deployed and details of landowner agreements, demonstrating how the land will be bought/ leased, and assurances that the land management will deliver the ecology objectives of the LBBIMP.
  - ii. An implementation timetable for the delivery of the fencing and habitat management measures that ensures all compensation measures are in place in time to allow four full breeding seasons prior to the operation of any turbine.
  - iii. Details of the design of the predator control fencing including the type of fencing, the area and location of enclosure, and details of any other habitat management measures.
  - iv. Details of the proposed ongoing monitoring and reporting on the effectiveness of the measures, including: survey methods; success criteria; adaptive management measures; timescales for the monitoring and monitoring reports to be delivered; and details of the factors used to trigger alternative compensation measures and/or adaptive management measures.
  - v. Details of the fence maintenance schedules.
  - vi. Minutes from all consultations with the LBBCSG.
- Results from the monitoring scheme must be submitted annually to the Secretary of State, and Natural England. This must include details of any finding that the measures have been ineffective in securing an increase in the number of adult lesser black-backed gulls available to recruit to the

<sup>118</sup> Defra (2021): *Best Practice Guidance for Developing Compensatory Measures in Relation to Marine Protected Areas*.

SAC and, in such cases, proposals to address this. Any proposals to address effectiveness must thereafter be implemented by the undertaker as approved in writing by the Secretary of State in consultation with Natural England.

- The fencing must not be decommissioned without written approval by the Secretary of State, given its role in maintaining the coherence of the National Site Network. Furthermore, it should be maintained beyond the operational lifetime of the wind farm if the site is colonised. The routine and adaptive management measures, and monitoring should continue whilst the fencing is in place.

### 12.3. Red-Throated Diver Compensation

The Secretary of State concludes that sufficient information has been provided to give confidence that necessary compensatory measures can be secured that will ensure the overall coherence of the National Site Network for red-throated diver.

The Secretary of State considers that, based on the implementation of an 8km buffer, the effective area of disturbance would be 8.38km<sup>2</sup> and the proposed compensation measures, which include navigational management for East Anglia Three OWF and East Anglia One OWF vessels, with monitoring and the creation of a stakeholder partnership, would represent appropriate compensation in relation to ensuring the overall coherence of the UK National Site Network.

The Applicant's proposed compensation and monitoring measures for red-throated divers, as presented in the Offshore Ornithology Without Prejudice Compensation Measures report<sup>110</sup>, the Applicants' Responses to SoS Questions 20<sup>th</sup> December 2021 (Item 5)<sup>Error! Bookmark not defined.</sup>, the Offshore In-Principle Monitoring Plan<sup>119</sup>, and the letter dated 11<sup>th</sup> March 2022<sup>120</sup> will be implemented through the process described below and secured as conditions of the DCO:

- A red-throated diver compensation steering group (RTDCSG) must be established, and the following details must be approved by the Secretary of State prior to the commencement of the authorised project:
  - i. The Terms of Reference of the RTDCSG.
  - ii. The membership of the RTDCSG.
  - iii. The schedule for meetings; the reporting and review periods; and the timetable for production of Red-Throated Diver Implementation and Monitoring Plan (RTDIMP).
  - iv. The dispute resolution mechanism.
- Prior to the installation of any turbine a RTDIMP must be submitted to the Secretary of State for approval (in consultation with the RTDCSG, MMO and the relevant statutory nature conservation body). The RTDIMP must include:
  - i. Details of the location where compensation measures will be deployed, why the location is appropriate ecologically and likely to support successful compensation, and details of agreements demonstrating how the vessel route diversions and/or exclusions will or have been secured to deliver the ecology objectives of the RTDIMP;

<sup>119</sup> Scottish Power Renewables (2021): *Offshore In-Principle Monitoring Plan*. Dated 25<sup>th</sup> March 2021.

<sup>120</sup> Scottish Power Renewables (2022): *East Anglia ONE North Clarifications in Relation to Matters Arising in Relation to Red-Throated Diver in the Outer Thames Estuary Special Protection Area*. Dated 11<sup>th</sup> March 2022.

- ii. An implementation timetable for delivery of the vessel route diversion and/or exclusion compensation measures are in place prior to the installation of any tower comprised within a wind turbine generator forming part of the authorised development; and
- iii. Details of the proposed ongoing monitoring of the measures including: survey methods; survey programmes; success criteria; recording of RTDCSG consultations and project reviews; details of the factors used to trigger alternative compensation measures and/or adaptive management measures.
- iv. Details of the members of the 'partnership' which should include Natural England, the MMO, JNCC, statutory port authorities, Crown Estates and Defra.
- v. Details of the work of the partnership, which should extend across the lifetime of the Project, including: the partnership's objectives; the timeframes for collecting data and implementing measures to reduce the disturbance/ displacement of red-throated divers; and reporting deadlines; and how any resulting strategies will be communicated with stakeholders.

Furthermore, the Applicant will comply with the following:

- i. Submit an annual report which demonstrates compliance with the vessel re-routeing measures will be submitted to the Secretary of State and Natural England. The report will be contain sufficient detail to enable vessel re-routeing to be compared to the distribution of red-throated divers.
- ii. The compensation measures will be in place before the installation of the first turbine and continue to operate until all the turbines are removed during decommissioning.
- iii. The rerouting measures will operate every day between 1<sup>st</sup> November and 31<sup>st</sup> March every year.
- iv. Undertake survey of red-throated diver abundance and distribution using aerial digital surveys in the Outer Thames Estuary SPA and a 10km buffer over two winters (i.e. pre and post construction of the Project or East Anglia Two OWF).
- v. The results of the red-throated diver surveys will be analysed to identify key drivers of disturbance/ displacement.
- vi. Submit an annual monitoring of red-throated diver distribution within the SPA and an appropriate buffer, based on digital aerial surveys. The monitoring will be designed to incorporate consideration of the vessel management measures and their effects. Results would be discussed with Natural England and the MMO.
- vii. Results from the monitoring must be submitted annually to the Secretary of State, Natural England and the MMO. This must include details of any findings that indicate that the displacement effects of the array are larger than predicted and/ or that the compensation measure do not adequately compensate for the displacement of red-throated divers from the array. In such cases, proposals to address this must be submitted for approval by the Secretary of State in consultation with Natural England and the MMO. The approved proposals to address effectiveness must thereafter be implemented by the undertaker.

### 12.4. Secondary Measures: Ornithological By-Catch

The Secretary of State agrees that the Applicant's proposal to investigate the extent of ornithological by-catch<sup>110</sup> would close an important knowledge gap and could benefit several seabird species in the long-term.

The Applicant's proposed package of measures (which includes: establishing a working group of academics, conservation bodies and the fishing industry; monitoring seabird by-catch; investigating and trialling of alternative fishing gear: and setting up of a fund for fishermen to improve equipment to reduce by-catch), will be implemented as set out in the without prejudice compensation measure report<sup>110</sup> and secured as conditions of the DCO.

## East Anglia One North Habitats Regulations Assessment

The Applicant will submit a technical report to the Secretary of State within one year of Action 4 (Year 3). The report will include the following information:

- i. The results of the by-catch monitoring;
- ii. The results of the investigations and trials of alternative fishing gear: and
- iii. The recommendations for reducing by-catch, based on the above studies.

The report should be suitable for public dissemination as stated in the without prejudice compensation measures report.

The compensation measures for the Project referred to in this HRA will be secured and delivered through the DCO as set out in Schedule 18.

Authors: Rachel Holmes BSc (Hons) MSc PhD MCIEEM, and Amy McHugh BSc (Hons) MSc.

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