Department for Business, Energy & Industrial Strategy

NORFOLK VANGUARD OFFSHORE WIND FARM

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

February 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 Norfolk Vanguard Offshore Wind Farm 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 will comprise of an offshore wind generating station of up to 1,800 megawatts ("MW") installed capacity, including up to 158 wind turbine generators, offshore electrical platforms, an onshore substation, an extension to the Necton National Grid substation in west Norfolk and overhead line modifications. The Project will cover an area of approximately 592 km^2 located in the southern North Sea approximately 47 km from the Norfolk Coast at its closest point to land. The landfall cable connection would have an underground cable route approximately 60 km in length to connect the Necton National Grid substation. The Project is described in more detail in Section 2.

The Project constitutes a Nationally Significant Infrastructure Project ("NSIP") as defined by s.14(1)(a) of the Planning Act 2008 as it is for an offshore generating station of over 100 MW.

The Project was accepted by the Planning Inspectorate ("PINS") on 24 July 2018 and a four-member Panel of Inspectors ("the Panel") was appointed as the Examining Authority ("ExA") for the application. The Examination of the Project application began on 10 December 2018 and completed on 10 June 2019. The Panel submitted its report of the Examination, including its recommendation ("the ExA's Report"), to the Secretary of State on 10 September 2019.

On 6 December 2019, following the close of Examination, the Secretary of State invited Interested Parties to provide additional updates or information regarding certain issues including those relating to potential impacts on qualifying features of sites within the UK's National Site Network[1].

On 1 July 2020, the Secretary of State granted development consent for the Project. A Decision Letter was published alongside an HRA which have now both been set aside.

Following the High Court judgement handed down on 18 February 2021[2] that quashed the Secretary of State's decision of 1 July 2020 to grant development consent for the Project, the Secretary of State took steps to redetermine the Project.

The Secretary of State wrote to all Interested Parties of the Project and the Norfolk Boreas project on 29 April 2021 to set out a process to remedy the failure to assess cumulative landscape and visual impacts

[1] BEIS (2019). *Application by Norfolk Vanguard Limited ("the Applicant") for an Order granting Development Consent for the proposed Norfolk Vanguard Offshore Wind Farm and associated offshore and onshore infrastructure ("the Norfolk Vanguard project"): Request for information and notification of the secretary of state's decision to set a new date for determination of the application*. Letter dated 6 December 2019.

[2] https://www.judiciary.uk/judgments/pearce-v-secretary-of-state-for-business-energy-and-industrial-strategy/

of both projects[3]. Having considered responses to his letter following the judgement, the Secretary of State decided to revisit the conclusions of the HRA in relation to the Alde-Ore Special Protection Area, the Flamborough and Filey Coast Special Protection Area, and the Haisborough, Hammond and Winterton Special Area of Conservation. In his letter dated 5 July 2021, the Secretary of State requested further information from the Applicant and Interested Parties which included further details of mitigation and compensation strategies for these protected sites (further details are provided in Sections 5.1, 5.4 and 5.9)[4]. In addition a further letter dated 11 August 2021 requested updates to collision risk and PVA modelling as well as updated bird mortality figures for Hornsea Project Three and additional evidence for the recovery of sandbanks from levelling (further details are provided in Sections 5.4 and 5.9)[5].

1.2 Habitats Regulations Assessment (HRA)

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") aim to ensure the long-term conservation of certain species and habitats by protecting them from possible adverse effects of plans and projects.

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 to apply. The Secretary of State notes the Application covers areas within and outside the 12 nm 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 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

[3] BEIS (2021). *Application by Norfolk Vanguard Limited ("the Applicant") for an Order granting Development Consent for the proposed Norfolk Vanguard Offshore Wind Farm and associated offshore and onshore infrastructure ("the Norfolk Vanguard project"). Request for Information Following the High Court's Decision to Quash the Norfolk Vanguard Offshore Wind Farm Order 2020.* 29 April 2021.

[4] BEIS (2021). *Application by Norfolk Vanguard Limited ("the Applicant") for an Order granting Development Consent for the proposed Norfolk Vanguard Offshore Wind Farm and associated offshore and onshore infrastructure ("the Norfolk Vanguard project"). Secretary of State's consideration of procedural matters following the High Court's decision to quash to Norfolk Vanguard offshore wind farm order 2020.* 5 July 2021.

[5] BEIS (2021). *Application by Norfolk Vanguard Limited ("the Applicant") for an Order granting Development Consent for the proposed Norfolk Vanguard Offshore Wind Farm and associated offshore and onshore infrastructure ("the Norfolk Vanguard project").* 11 August 2021.

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 on any such site, alone or in-combination with other plans or projects. Where the potential for likely significant effect 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 likely significant effects 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 ("NE") is the Statutory Nature Conservation Body ("SNCB") for England and for English waters within the 12 nm limit. The Joint Nature Conservation Committee ("JNCC") is the SNCB beyond 12 nm, but this duty has been discharged by NE following the 2013 Triennial Review of both organisations[6] [7]. 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 nautical miles offshore) and as such continues to provide advice to NE 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

[6] https://www.gov.uk/government/publications/triennial-review-of-the-environment-agency-ea-and-natural-england-ne

[7] https://www.gov.uk/government/publications/triennial-review-of-the-joint-nature-conservation-committee-jncc

information received during the Examination (up until 2 May 2019) 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. Consultation on the RIES was undertaken between 9 May 2019 and 30 May 2019. 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 protected sites.

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[8]. In particular:

- The ExA's Report
- The Applicant's ES
- The Applicant's HRA Report ("HRAR") titled Norfolk Vanguard Information to Support HRA
- Written responses to the Secretary of State's requests for further information

Plus, other information submitted during the Examination and during the Secretary of State's consideration of the Application.

Key information from these documents is summarised in this report.

[8] https://infrastructure.planninginspectorate.gov.uk/projects/eastern/norfolk-vanguard/?ipcsection=docs

2 Development description

Figure 1 shows the Project location in the southern North Sea. The offshore component of the Project would be situated off the coast of Norfolk, approximately 47 km from the shore at the nearest point. It would comprise two distinct offshore array areas, Norfolk Vanguard ("NV") East and NV West occupying an area of roughly 59,200 ha.

The main offshore elements of the Project comprise:

- Up to 158 offshore wind turbines and their associated foundations;
- Offshore electrical platforms;
- Accommodation platforms to house offshore workers as required;
- Up to two meteorological masts;
- Measuring equipment (LiDAR and wave buoys);
- Array cables;
- Interconnector cables; and
- Export cables to a connection point at Happisburgh on the Norfolk coast.

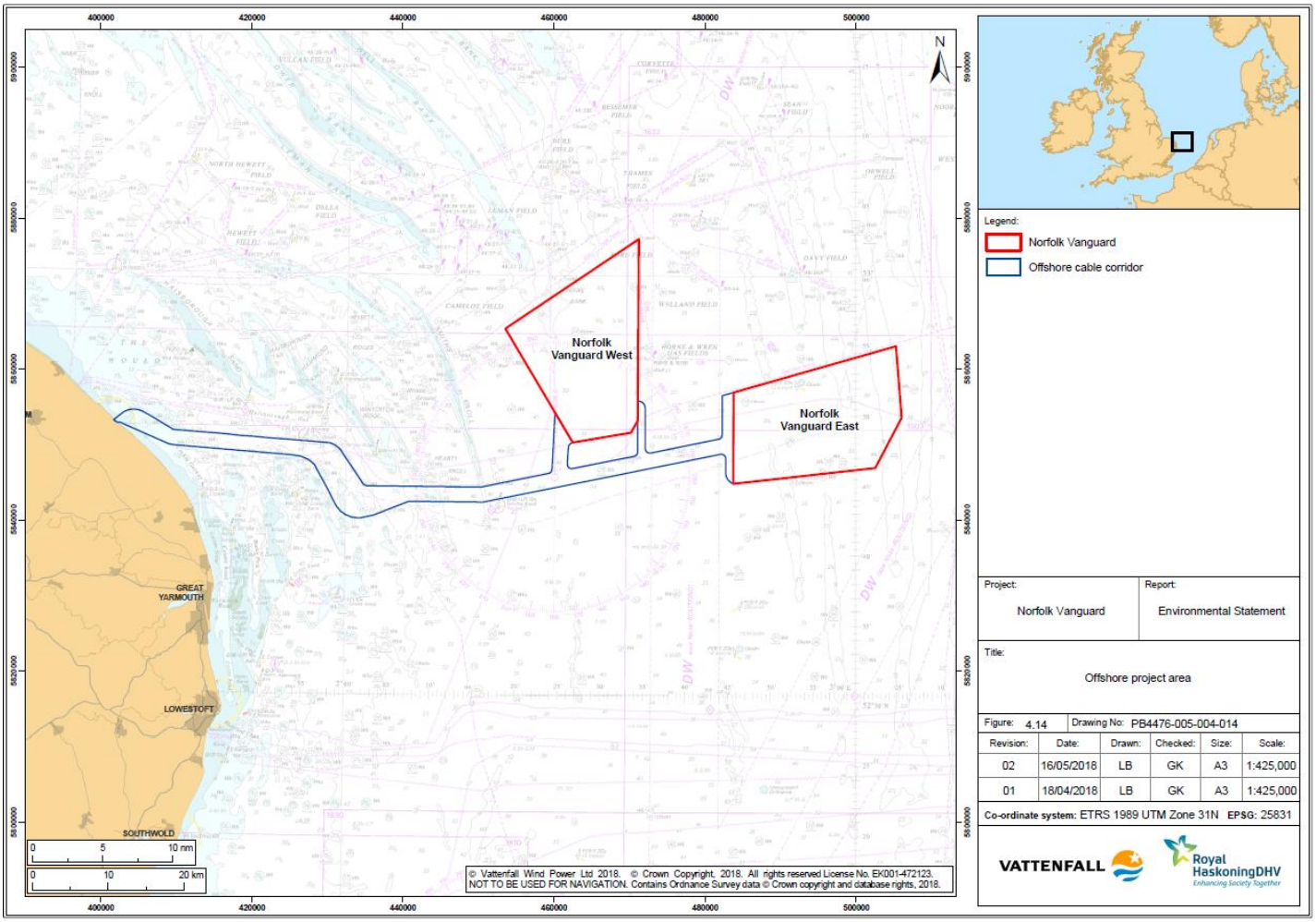

Figure 1: Proposed location of the Project (offshore works)

The buried export cable corridor would connect the offshore development to a landfall at Happisburgh South, Norfolk. The buried onshore cable corridor would run between the landfall and the proposed onshore project substation. The route is approximately 60 km long, running through predominantly agricultural land and nearby towns and villages including Happisburgh, North Walsham, Aylsham, Reepham, Dereham and Necton. The substation would be located to the east of the existing National Grid substation at Necton (Figure 2).

The key onshore components of the Project would comprise:

- Landfall works including ducts installed under the cliff by horizontal directional drilling ("HDD") and onshore transition pits;
- Sets of ducting for the Project cables and up to four sets for Norfolk Boreas cables through which the onshore cables would be pulled;
- Surface water management, bunding, embankments, boundary treatments and landscaping;
- Trenchless crossing points at sensitive locations such as some roads, railways and sensitive habitats;
- Mobilisation areas;
- Highway works;
- Onshore project substation; and

- Extension to the Necton National Grid substation and overhead line modifications.

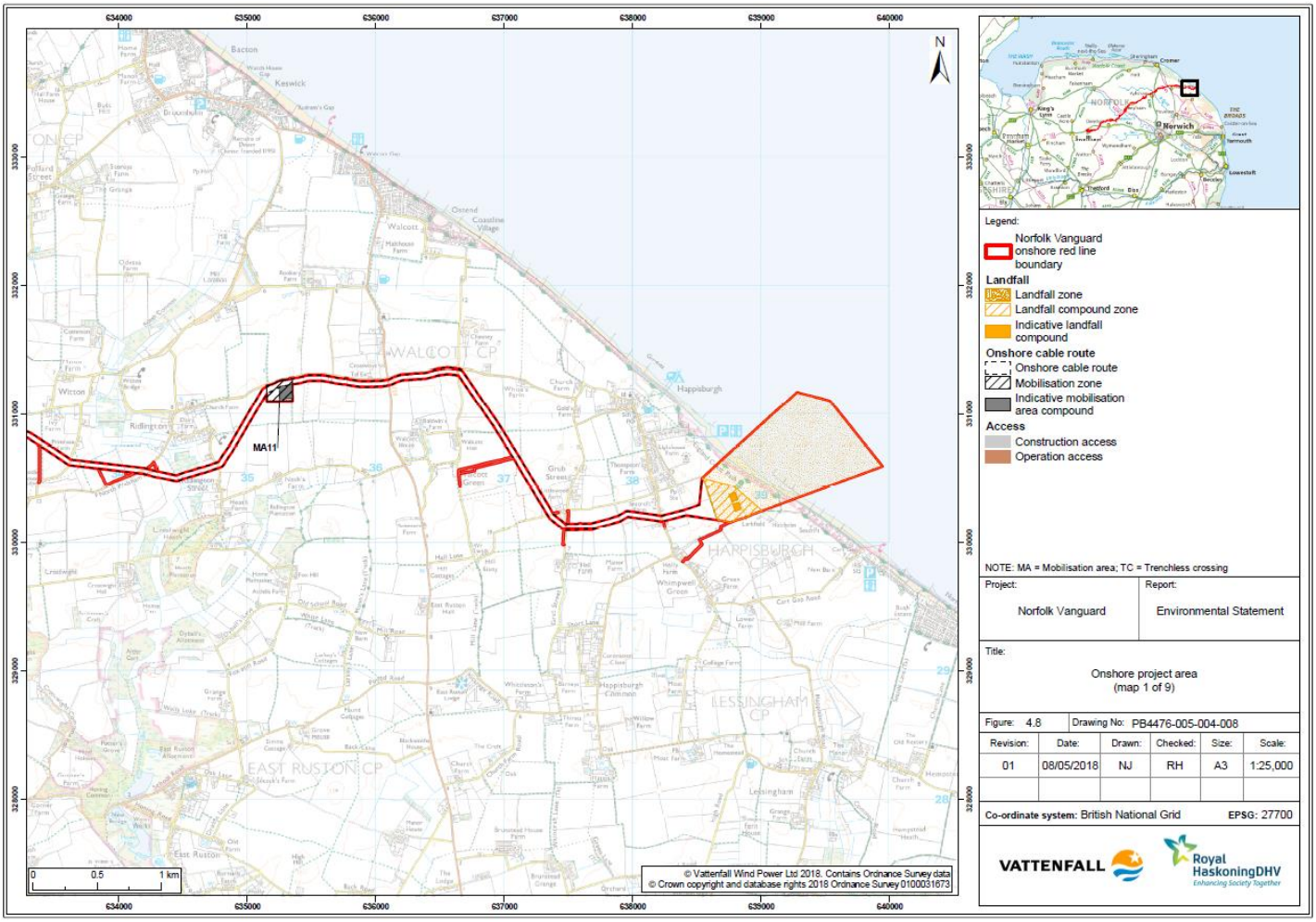

Figure 2: Proposed location of the Project (onshore works)

The parent company of Norfolk Vanguard Limited (Vattenfall Wind Power Ltd) is also developing Norfolk Boreas[9] which would share a grid connection location as well as much of the offshore and onshore cable corridors with the Project. As a result, the Development Consent Order application also includes some enabling works for Norfolk Boreas including:

- Installation of ducts to house the Norfolk Boreas cables along the entirety of the onshore cable route from the landward side of the transition pit at the landfall to the onshore project substation; and
- Overhead line modifications at the Necton National Grid substation for both projects.

The Project design envelope sets out a series of design options for the Project and has a reasoned minimum and maximum extent for a number of key parameters. The final design would lie between the minimum and the maximum extent of the consent sought for all aspects of the Project. The final detailed design of the Project, which would occur post-consent, would fall within this 'envelope'. In addition, post-consent/pre-construction site investigation would further inform the detailed design.

[9] https://infrastructure.planninginspectorate.gov.uk/projects/eastern/norfolk-boreas/?ipcsection=docs&stage=6

The final offshore construction programme will be submitted to the Marine Management Organisation ("MMO") under condition 14(1)(b) of the generation assets deemed Marine Licence and condition 9(1)(b) of the transmission assets deemed marine licence in the draft DCO. The construction programme must include details of a proposed construction start date; proposed timings for mobilisation of plant delivery of materials and installation works; proposed pre-construction surveys, baseline report format and content, construction monitoring, post-construction surveys and monitoring and related reporting; and an indicative written construction programme for all wind turbine generators, meteorological masts, measurement buoys, offshore electrical platforms and cables (including fibre optic cables) comprised in the works in Part 3 (licenced marine activities) of the Deemed Marine Licence.

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 development is likely to have a 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 to determine whether significant effects are likely.

The purpose of this section is to identify any likely significant effects 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 likely significant effects could not be excluded for the following sites and their qualifying features, either alone or in-combination with other plans or projects.

- Alde-Ore Estuary SPA;
- Flamborough and Filey Coast SPA;
- Greater Wash SPA;
- Haisborough, Hammond and Winterton SAC;
- Southern North Sea SAC;
- Humber Estuary SAC;
- The Wash and North Norfolk SAC;
- River Wensum SAC;
- Paston Great Barn SAC;
- Norfolk Valley Fens SAC; and
- The Broads SAC.

Table 1 (summarised from the RIES and ExA Report) summarises the features for which significant effects, either alone or in combination, cannot be excluded for each site. The ExA report and the RIES provide further information on sites and features which were considered, but for which likely significant effect were screened out.

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

Protected Site	Distance from the Project	Features for which likely significant effect have been identified	Potential Impact alone and in-combination
SPAs and Ramsars			
Alde-Ore Estuary SPA and Ramsar	92 km	Lesser black-backed gull *Larus fuscus*	Collision with turbines during operation leading to mortality.
Breydon Water SPA and Ramsar	53 km	Avocet *Recurvirostra avosetta* Bewick's swan *Cygnus columbianus bewickii* Golden plover *Pluvialis apricaria* Waterbird assemblage Ramsar Criterion 5 and 6	Migrating birds colliding with turbines leading to mortality.[10]
Broadland SPA and Ramsar	3.6 km	Bewick's swan Whooper swan *Cygnus cygnus* Ramsar Criterion 6	Impacts to *ex-situ* habitats.
		Bittern *Botaurus stellaris* Bewick's swan Whooper swan Eurasian wigeon *Anas penelope* Gadwall *Anas strepera* Northern shoveler *Spatula clypeata* Eurasian marsh harrier *Circus aeruginosus* Hen harrier *Circus cyaneus* Ruff *Philomachus pugnax* Ramsar Criterion 6	Migrating birds colliding with turbines leading to mortality.[10]

[10] The ExA progressed disturbance/displacement and barrier effects for Ramsar Criterion 6 to the integrity matrix on a precautionary basis as the Applicant's screening conclusions were unclear [ExA Report: 6.5.27], but no evidence has been presented by the Applicant or any other interested party to support this. The Secretary of State considers that there is no likely significant effect from barrier effects.

Protected Site	Distance from the Project	Features for which likely significant effect have been identified	Potential Impact alone and in-combination
Flamborough and Filey Coast SPA	205 km	Gannet *Morus bassanus* (breeding) Kittiwake *Rissa tridactyla* (breeding)	Collision of foraging birds with turbines during operation leading to mortality.
		Gannet Razorbill *Alca torda* Guillemot *Uria aalge* Seabird Assemblage	Displacement from the array of foraging birds leading to mortality.
Greater Wash SPA	0 km from export cable, 36 km from array	Red-throated diver *Gavia stellata* Common scoter *Melanitta nigra*	Disturbance and displacement of overwintering birds during cable laying.
		Little gull *Hydrocoloeus minutus*	Collision of overwintering birds with turbines during operation leading to mortality.
North Norfolk Coast SPA and Ramsar	80 km	Great bittern *Botaurus stellaris* Pink-footed goose *Anser brachyrhynchus* Dark-bellied brent goose *Branta bernicla* Eurasian wigeon Eurasian marsh harrier Pied avocet *Recurvirostra avosetta* Red knot *Calidris canutus*	Migrating birds colliding with turbines leading to mortality.[10]
		Montagu's harrier *Circus pygargus* Ramsar Criterion 5 and 6	Migrating birds colliding with turbines leading to mortality. Disturbance/displacement. Barrier effects.
Outer Thames SPA	21 km	Red-throated diver (non-breeding)	Disturbance and displacement from vessel movements.

Protected Site	Distance from the Project	Features for which likely significant effect have been identified	Potential Impact alone and in-combination
SACs			
Haisborough, Hammond and Winterton SAC	0 km (cable route intersects SAC)	Sandbanks slightly covered by seawater at all times Reef	Permanent loss (and introduction of new substrate where applicable). Temporary physical disturbance. Smothering due to increased suspended sediment. Re-mobilisation of contaminated sediments.
Norfolk Valley Fens SAC [11]	0.6 km	Alkaline fens Northern Atlantic wet heaths with *Erica tetralix* European dry heaths; Molinia meadows on calcareous, peaty or clayey-silt-laden soils Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* Semi-natural dry grasslands and scrubland facies on calcareous substrates Narrow-mouthed whorl snail Desmoulin's whorl snail	Indirect effects on features present within *ex-situ* habitats of the SAC arising from groundwater / hydrology effects.
Paston Great Barn SAC[12]	2.9 km	Barbastelle bats *Barbastella barbastellus*	Direct effects in *ex-situ* habitats of SAC.

[11] Although a number of potential effects on Norfolk Valley Fens SAC were identified within the RIES, during Examination only impacts relating to groundwater/hydrology effects were considered. Having considered the ExA report and representations made by Natural England, the Secretary of State agrees with the ExA that there will be no likely significant effect from the Project arising from air quality on the qualifying features of the site.

[12] Although a number of potential effects on Paston Great Barn SAC were identified within the RIES, during Examination only construction phase noise disturbance was identified as having the potential to cause a likely significant effect (Table 6.3 of ExA Report). Having considered the ExA report and representations made by Natural England, the Secretary of State agrees that indirect effects in *ex*-situ habitats from light and groundwater/hydrology effects can be excluded. However, he considers that direct effects in *ex-situ* have the potential for a likely significant effect on the qualifying feature of the site.

Protected Site	Distance from the Project	Features for which likely significant effect have been identified	Potential Impact alone and in-combination
			Indirect effects in *ex-situ* habitats from light and groundwater/hydrology effects Noise disturbance during construction.
Southern North Sea SAC	0 km	Harbour porpoise *Phocoena phocoena*	Auditory injury and disturbance from underwater noise during piling operations. Vessel disturbance and collision. Changes to prey resource. Changes to water quality.
River Wensum SAC [13]	0 km	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation Desmoulin's whorl snail *Vertigo moulinsiana*	Direct effects within the *ex-situ* habitats of the SAC. Direct effects (e.g. habitat loss) on land within the SAC boundary. Impacts from alterations to geology and land contamination. Disturbance due to groundwater/hydrology changes.
The Broads SAC	3.6 km	Hard oligo-mesotrophic waters with benthic vegetation of *Chara spp* Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation Transition mires and quaking bogs Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae Alkaline fens Alluvial forests with *Alnus glutinosa* and	Indirect effects upon habitats and species within the SAC boundary arising from changes in local groundwater / hydrology conditions. Direct effects (e.g. habitat loss) on land within the SAC boundary.

[13] Although a number of potential effects on River Wensum SAC were identified within the RIES, during Examination only Direct effects (e.g. habitat loss) on land within the SAC boundary was identified as having the potential to cause a likely significant effect (Table 6.3 of ExA Report). Having considered the ExA report and representations made by Natural England, the Secretary of State agrees with this conclusion and considers the Direct effects within the *ex-situ* habitats of the SAC as having a likely significant effect on the qualifying features of the site. The Project will not cause a likely significant effect from Indirect effects within the *ex-situ* habitats from geology/contamination/groundwater/hydrology effects or Indirect effects within the SAC from geology/contamination/groundwater/hydrology.

Protected Site	Distance from the Project	Features for which likely significant effect have been identified	Potential Impact alone and in-combination
		Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*) Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) Desmoulin's whorl snail Fen orchid *Liparis loeselii* Ramshorn snail *Anisus vorticulus*	
		Otter *Lutra lutra*	Direct effects upon *ex-situ* habitats which may support the qualifying feature otter, due to suitable *ex-situ* habitats for this feature being present. Indirect effects upon *ex-situ* habitats which may support the qualifying feature otter, arising from changes in groundwater / hydrology conditions.
The Humber Estuary SAC	112 km from export cable, 150 km from array area	Grey seal *Halichoerus grypus*	Disturbance at haul out sites. Disturbance when foraging at sea. At sea collision with vessels leading to mortality.
The Wash and North Norfolk SAC	33 km from export cable, 82 km from array	Harbour (common) seal *Phoca vitulina*	Disturbance at haul out sites. At sea collision with vessels leading to mortality.

The Applicant concluded a likely significant effect on the Winterton-Horsey SAC in its HRAR for grey seal which are not currently features of the SAC, however, it was included in the Applicant's assessment as it is recognised as an important breeding, moulting and haul-out site. No screening or integrity matrices were included for the SAC. The ExA did not consider there to be a likely significant effect on the Winterton-Horsey Dunes SAC (Table 6.3 of the ExA Report). Having considered the ExA Report and representations made by NE, the Secretary of State agrees with this conclusion and considers that a likely significant effect can be excluded from the site.

The Secretary of State has considered the potential effects of the application on all relevant interest features, in view of their conservation objectives, on existing protected sites including the 19 protected sites listed above to determine whether there will be likely significant effects in the context of the Habitats Regulations.

3.1 Likely Significant Effects Alone Assessment

The Secretary of State agrees with the recommendations of the ExA and concludes that likely significant effects cannot be excluded at the 19 sites listed in Table 1, 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 projects which may affect the designated site feature under consideration. The plans or projects included in the in-combination assessment include several planned and existing offshore wind farms within the vicinity of the Project.

The Secretary of State agrees with the recommendations of the ExA and concludes that likely significant effects cannot be excluded at the 19 sites listed in Table 1 when the impacts of the Project are considered in-combination with other plans or projects.

The 19 sites listed in 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[14].

The purpose of this AA is to determine whether adverse effects on the integrity of the features of the 15 sites identified can be ruled out as a result of the Project alone or in combination with other plans or 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[15]. 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*".

The conservation objectives have been established by NE. 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.

NE 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.

[14] https://www.gov.uk/guidance/appropriate-assessment#what-must-an-appropriate-assessment-contain

[15] https://www.gov.uk/guidance/appropriate-assessment

Where supplementary advice is not yet available for a site, NE 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 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; and
- 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; and
- 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 Marine Mammals

The following section explains the approach taken to assessing the impacts of the Project on marine mammals.

The Applicant's assessments for all the marine mammal SACs are based on a realistic worst-case scenario, with the parameters listed in Table 8.9 of [APP-045]. They include the expected number of UXO requiring removal, the maximum number of piled foundations, and maximum hammer energies used in piling.

The potential effects considered by the Applicant in relation to marine mammals is broadly described as:

- Injury or disturbance from increases in underwater noise from piling, UXO clearance and vessel movements;
- Increased collisions with vessels;
- Changes to the availability of prey as a result of habitat loss, increases in underwater noise and changes in water quality;
- Changes in water quality; and
- Disturbance at haul-out sites (for seal species only).

The Applicant initially proposed the following mitigation for marine mammals in [APP-045]:

- Use of a soft-start and ramp-up protocol so that each piling event would begin with soft-start for a minimum of 10 minutes at 10% of the maximum hammer energy, followed by a gradual ramp-up for at least 20 minutes to the maximum hammer energy. This would allow marine mammals to move away from the area before the maximum hammer energy was reached;
- A Marine Mammal Mitigation Protocol ("MMMP") for piling to be developed pre-construction in consultation with the relevant SNCBs and the MMO. This would present details of measures to reduce permanent auditory injury; and
- A MMMP for UXO clearance – the dDCO does not seek powers to undertake UXO clearance, this would be subject to a separate Marine Licence. However, the Applicant has included an assessment of the anticipated effects of UXO clearance and the relevant mitigation in [APP-045].

The Applicant also submitted an Outline Project Environmental Management Plan ("OPEMP") which was submitted with the Application and updated during Examination [REP9-022], to deliver mitigation measures to control the accidental release of pollutants during construction.

4.3 Marine Ornithology

The Secretary of State's AA begins with a focus on SPA sites containing seabird populations upon which the Project is likely to have a significant effect. Several aspects of the Applicant's approach to ornithological impact assessment remained unresolved among Interested Parties by the close of Examination. Disagreements remained on seabird matters relating to the Flamborough and Filey Coast SPA and the Alde-Ore Estuary SPA. Following the close of Examination, the Secretary of State requested further information in relation to certain impacts including in-combination impacts on the qualifying kittiwake feature of the Flamborough and Filey Coast SPA and the qualifying lesser black-backed gull feature of the Alde-Ore Estuary SPA (BEIS 2019)[16].

Before undertaking an AA for these sites, the Secretary of State has summarised the various positions expressed both during the Examination on seabird matters, as reported in the ExA report and in the RIES and in subsequent responses to the request for further information made by the Secretary of State both during his initial determination of the Project in 2020 and subsequently to support his redetermination of the Project in 2022.

4.3.1 Bird Density

Throughout the Examination, NE advised that the upper 95% confidence intervals ("CIs") on density be applied to the species abundance estimates to give a range of predicted mortalities. The Applicant believes that the 95% CIs are heavily weighted by a small proportion of the survey data whereas the mean is more representative of all the years' data. As such the Applicant contends that the use of 95% CIs without full consideration of the underlying distributions has the potential to introduce very strong precaution.

NE [REP9-057] noted that surveys are unlikely to capture the full extent of variation in density/abundance of seabirds and this uncertainty in the survey dataset needs to be properly addressed. NE considered it

[16] BEIS (2019). *Application by Norfolk Vanguard Limited ("the Applicant") for an Order granting Development Consent for the proposed Norfolk Vanguard Offshore Wind Farm and associated offshore and onshore infrastructure ("the Norfolk Vanguard project"): Request for information and notification of the secretary of state's decision to set a new date for determination of the application*. Letter dated 6 December 2019

entirely appropriate for the Applicant to present values from both upper and lower confidence limits for consideration.

The RSPB [REP9-063] also considered that whilst the mean or other measures of central tendency are the figures used in the assessment, the confidence levels allow consideration of the variability and therefore the uncertainty. Consequently, not to express such uncertainty would not be in accordance with the precautionary principle.

The Applicant subsequently presented bird density data including the confidence intervals in subsequent submissions.

The ExA was of the view that it is appropriate to consider the upper confidence interval due to the inherent degree of uncertainty that is likely to exist in the ornithological data.

4.3.2 Collision Risk

4.3.2.1 Model Used

The Applicant's collision risk modelling (CRM) calculations [APP-217] were produced using scripted versions (in R) of the Band (2012) model (hereafter referred to as the Applicant's stochastic CRM). During Examination concerns were raised by NE [RR-106] [REP1-088] and RSPB [RR-197] over the suitability of the CRM. In particular, the suitability of the Applicant's stochastic model over the NE and RSPB preferred deterministic model.

Further to discussions during Examination, and as a result of change to the worst-case scenario, the Applicant provided a number of revisions to the CRM which were based on the Band (2012) deterministic model.

At Deadline 9 the Applicant and NE agreed to use the following for CRM:

- Band option 2 deterministic CRM, presenting results for mean seabird density (and 95% CI);
- NE advised species specific avoidance rates (+/- 2 SD);
- BTO flight height estimates (and 95% CI); and
- NE advised nocturnal activity rates [REP9-046].

Additional CRM was undertaken by the Applicant during the post-Examination period following a reduction in the number of turbines and an increase in the minimum draught heights (Vattenfall 2020a)[17]. NE agreed with the revised CRM figures calculated by the Applicant for the Project for both kittiwakes from the Flamborough and Filey Coast SPA and for lesser black-backed gulls from the Alde-Ore Estuary SPA (NE 2020)[18].

Further CRM was carried out by the Applicant during the redetermination of the Project for the kittiwake, razorbill, gannet and guillemot features of the Flamborough and Filey Coast SPA[19].

[17] Vattenfall (2020a). *Norfolk Vanguard Offshore Wind Farm Additional Mitigation Department for Business, Energy and Industrial Strategy (BEIS) Request for information*. Doc. Ref: ExA; Mit; 11.D10.2. 28 February 2020.

[18] Natural England (2020). *Norfolk Vanguard – Applicant's submission to Secretary of State Consultation Request for further information*. Letter dated 27 April 2020.

[19] Vattenfall (2021). *Norfolk Vanguard Offshore Wind Farm Updated Population Viability Analysis: Flamborough and Filey Coast SPA.* Doc. Ref: ExA.AS-2.D12.V1. 25 August 2021.

4.3.2.2 Bird Density Values

NE ([RR-106][REP1-088], comments on Appendix 3.2 in [REP3-051][REP4-062] and RSPB [RR-197][REP1-110] raised concerns over the use of median bird density values within the CRM and advised that mean values were used, as had previously been used for offshore wind farm assessments.

Further to these discussions, the Applicant's revised CRM assessments [REP6-021] [AS-043] and [REP7-062] were presented based on mean values.

4.3.2.3 Revision of Worst-Case Scenario

At Deadline 4, the Applicant (Q23.64 of [REP4-040]) explained that it had removed the option to use the smallest and most numerous 9 MW turbine. The increase in minimum turbine size was welcomed by the RSPB [REP6-038] and the Applicant's Deadline 6 updated CRM [REP6-021] used parameters for the 10 MW turbine as a worst-case scenario. The Applicant explained that this reduced collision risk for the Project by approximately 10% [REP7-059].

Following a review of the project design, the Applicant revised the wind turbine layouts (in addition to exclusion of the 9 MW turbine) and subsequently submitted an update to seabird collision risk estimates in an additional submission [AS-043]. The revised wind turbine layout would be based on the following maximum proportion of turbines which could be installed in either site with two alternative scenarios:

(a) the maximum proportion of turbines in NV West would be two-thirds (with one-third in NV East); or

(b) the maximum proportion of turbines in NV East would be half (with the other half in NV West).

The Applicant presented collision estimates for both scenario (a) and (b) for each species in order to identify the species-specific worst-case design, which reflected differences in the densities of a particular species across NV East and NV West; it confirmed that the higher estimate in each case represented the worst-case for assessment. The Applicant stated that in all cases significantly lower collisions were estimated than those presented in the Deadline 6 CRM [REP6-021] and the average reduction in collision mortality was 34%.

The Applicant provided a revised assessment of effects (including an in-combination assessment) at Deadline 7 [REP7-062], which was based on the collision risk estimates presented in an additional submission [AS-043].

Subsequent to Examination the Applicant further refined the turbine layouts at NV East and NV West, including a reduction in the number of turbines from 180 to 158 and an increase in the minimum draught heights of turbines to either:

- 35m above ("mean high water springs") MHWS for turbine models of up to and including 14.6MW capacity; and
- 30m above MHWS for turbine models of 14.7MW and above (Vattenfall 2020a)[20].

The revised turbine layout is secured in Requirement 3(1) and Conditions 1(3)(a) and 8(1)(b) of Schedule 1, and Conditions 1(3) and 8(1)(b) of the Generation Asset dML (Schedules 9 and 10).

[20] Vattenfall (2020a). *Norfolk Vanguard Offshore Wind Farm Additional Mitigation Department for Business, Energy and Industrial Strategy (BEIS) Request for information*. Doc. Ref: ExA; Mit; 11.D10.2. 28 February 2020.

4.3.2.4 Avoidance Rates

RSPB [RR-197][REP1-112][REP4-070][REP6-038][REP7-083] disagreed with the 98.9% avoidance rate used by the Applicant for gannet during the breeding season, stating that a 98% avoidance rate is more appropriate. However, the 98.9% avoidance rate was advocated by NE [RR-106][REP1-088]. The RSPB [REP7-083] confirmed that it would base its conclusions on the use of a 98% avoidance rate for the breeding season, although it did not submit any calculations using this rate.

4.3.2.5 Nocturnal Activity Factors

For breeding gannet and kittiwake of the Flamborough and Filey Coast SPA, the Applicant's CRM (described in [APP-217]) used nocturnal activity rates derived from tracking studies undertaken by Furness *et al*. (2018)[21]. NE [RR-106] did not agree with their use as the studies had not been published nor were publicly available; instead, it advocated the use of nocturnal activity factors as per Garthe & Hüppop (2004)[22]. RSPB [RR-197][REP1-110] also disagreed with the rates used by the Applicant and considered they would result in inaccurate underestimates of collision risk as they did not consider the potential interaction between survey timing and diurnal behavioural patterns.

Further to these discussions, the Applicant's Deadline 7 updated CRM [REP7-062] used a nocturnal activity rate of 25% for gannet and 50% for kittiwake and the Applicant and NE were in agreement in the use of its preferred nocturnal activity rates [REP9-046].

Regarding gannet, the RSPB [REP7-083] acknowledged that surveys had been spread through daylight hours, however noted that there was very little survey effort at first and last light, thereby likely missing the peak foraging times, and thereby peak mortality risk for several species. Regarding kittiwake, the RSPB stated the peer-reviewed data is extremely limited and patchy and cannot be relied upon.

4.3.2.6 Population Viability Analysis

To account for the decision to grant development consent to the Hornsea Project Three Offshore Wind Farm subsequent to the High Court decision to quash the Secretary of State's original decision to grant development consent for the Project, the Applicant provided updated PVA models for the kittiwake, razorbill, gannet and guillemot of the Flamborough and Filey Coast SPA. Modelling was presented using the online NE commissioned PVA tool and models were run for 5,000 simulations, as advised by NE[23].

4.3.3 Apportioning

4.3.3.1 Lesser Black-backed Gull to Alde-Ore Estuary SPA

NE [REP1-088][REP7-075] confirmed it was content with the apportioning rates used by the Applicant for the non-breeding season. However, NE [RR-106][REP1-088] queried the robustness of the evidence supporting the approach to apportion 25% of impacts to lesser black-backed gull during the breeding

[21] Furness, R.W., Garthe, S., Trinder, M., Matthiopoulos, J., Wanless, S. and Jeglinski, J. (2018) *Nocturnal flight activity of northern gannets Morus bassanus and implications for modelling collision risk at offshore wind farms.*

[22] Garthe, S. and Hüppop, O. (2004) Scaling possible adverse effects of marine wind farms on seabirds: developing and applying a vulnerability index. *J. Appl. Ecol.* 41: 724–734

[23] Vattenfall (2021). *Norfolk Vanguard Offshore Wind Farm Updated Population Viability Analysis: Flamborough and Filey Coast SPA.* Doc. Ref: ExA.AS-2.D12.V1. 25 August 2021.

season, stating that the Applicant had not taken account of the distance each colony is from the Project site, or segregation; that there may be some colonies within the foraging range that should be considered; and that the Applicant had doubled the summed urban colonies figure based on the age of the data. It advised [REP7-075] that tracking data and the Applicant's original submission documents show evidence of potential connectivity between lesser black-backed gulls from the Alde-Ore Estuary SPA and the Project. The RSPB [RR-197][REP1-110] similarly disagreed with the Applicant's methods and considered it unlikely that urban gulls would forage offshore to the same extent as those breeding at coastal 'natural' colonies and that the inclusion of urban birds therefore dilutes the potential significance of the impact. NE and the RSPB advocated the approach in Scottish Natural Heritage ("SNH") guidance 2018 which is based on foraging range and colony factors [REP1-112][REP7-083].

The Applicant (response to Q23.35 of [REP1-007] and WQ 23.71 of [REP4-040]) responded stating that tracking data indicated very low connectivity between breeding lesser black-backed gull at Alde-Ore Estuary SPA and the Project site. It concluded that less than 3.5% of the lesser black-backed gulls at the Project during chick-rearing period are likely to originate from the Alde-Ore Estuary SPA and therefore considered apportioning 25% of breeding season impacts to the SPA as highly precautionary.

However, NE (Q23.35 [REP2-036] [REP3-051][REP4-062]) advised that tracking data would vary between years and that the foraging behaviour of town colonies still required consideration. RSPB [REP2-035][REP4-070] did not agree that diets from urban and rural coastal colonies would be similar and its position on apportionment remained unchanged.

At Deadline 6, the Applicant (Section 2.4 of [REP6-021]) explained that the lesser black-backed gull mean breeding season foraging range is 72 km from colonies; the mean maximum foraging range is 141 km; and a maximum recorded foraging range is 181 km. The Alde-Ore Estuary SPA is 92 km and is the only British lesser black-backed gull SPA colony within maximum foraging range from the Project; non-SPA lesser black-backed gull colonies also exist, including urban colonies in Suffolk & Norfolk and it is likely birds from these are present at the Project. It stated that data shows urban colony numbers have been increasing, whilst SPA colony numbers have been decreasing since 2000. The Applicant concluded:

- For the breeding season – based on relative population sizes and colony distance, combined with age ratios, the breeding adults from Alde-Ore Estuary SPA would comprise less than 17% of the on-site birds, while tracking data suggests this percentage would most likely be less than 3%;
- During migration – birds associated with the Alde-Ore Estuary SPA represent about 3.3% of the biologically defined minimum population scales ("BDMPS"); therefore, it is likely that about 3.3% of the estimated collision mortality during the autumn and spring migration periods would affect birds associated with the Alde-Ore SPA population, of which around 60% would be breeding adults (i.e. 2% of the total collision mortality would be breeding adults from Alde-Ore Estuary SPA); and
- During winter – the proportion of birds from the Alde-Ore Estuary SPA would be approximately 5% of the BDMPS populations; hence, no more than 5% of the estimated collision mortality on the lesser black-backed gull population during winter would be apportioned to the Alde-Ore Estuary SPA breeding population.

Further to these discussions, the Applicant's Deadline 7 updated CRM [REP7-062] was presented based on the above seasonal apportionment figures. (Both breeding season values have been used in the assessment for the breeding season and represent upper and lower limits on apportioning rates, derived from the available evidence). The Applicant provided further detailed justification for these apportioning rates in [REP7-062].

NE [REP7-075] acknowledged that the variable ecology of lesser black-backed gull between individuals within a colony and between seasons and years had made it difficult to determine an actual figure for use in apportionment. Therefore, it advised a full range of apportionment rates for the breeding season be considered, with a focus on rates between 10 and 30% to provide a realistic worst-case scenario of the proportion of birds from the SPA. The RSPB [REP7-083] noted that the Applicant's approach does not conform with NE's advice and did not agree with the apportioning out of juveniles. It argued that doubling the 17% breeding season apportioning value would be reasonable and appropriate and has based its conclusions on that value.

On a related matter, there was also some discussion on how to define the breeding season. NE [RR-106][REP1-088] advised that as the Project is located within the mean-maximum foraging range of lesser black-backed gull from the Alde-Ore Estuary SPA, the breeding season should be defined as the full breeding season presented in Furness (2015)[24]. The Applicant confirmed that the assessment for lesser black-backed gull considered both the migration free and extended breeding season [REP2-036]. However, NE [RR-106][REP1-088][REP4-062] stated that it was unclear whether the Applicant had adjusted the migration seasons to account for overlapping months. The Applicant [REP6-021] stated that it considered the migration free season to be more appropriate for assigning collisions to the SPA; nonetheless it also presented the full breeding season in its Deadline 7 revised CRM [REP7-062].

NE also disputed the Applicant's approach to apportioning of in-combination impacts. It confirmed [REP7-075] the Applicant's approach to apportion 4% of in-combination impact in the non-breeding season was acceptable but considered that the generic rate of 30% apportionment to the total breeding season collision predictions from all wind farms within 141 km of the SPA was overly simplistic; it advised using the apportionment rates used by the other wind farms in their assessments.

At Deadline 9 the Applicant maintained the position that there was no justification for the assessment to be based on a range of percentages [REP9-031].

The ExA did not consider the level of precaution applied to the Applicant's assessment as a result of NE's advice to be excessive and supported NE's preferred approach to apportioning impacts of lesser black-backed gull.

4.3.3.2 Kittiwake to Flamborough and Filey Coast SPA

The Applicant's HRA Report [APP-045] apportioned 16.8% of kittiwake present during the breeding season to the Flamborough and Filey Coast SPA. However, NE had concerns over the Applicant's use of a 16.8% apportionment figure [RR-106][REP1-049][REP3-051]. Both NE [RR-106][REP1-088] and the RSPB [RR-197][REP1-112][REP6-038] advised that the Applicant should consider RSPB kittiwake tagging data from 2017 which indicates that birds from the Flamborough and Filey Coast SPA do forage within the Project, particularly NV West, and then revisit the breeding season apportionment.

The Applicant [REP2-003] expressed concerns about the RSPB kittiwake data and explained (Q23.72 of [REP4-040]) that it had followed the approach adopted for the Dogger Bank Creyke Beck, Dogger Bank Teesside and East Anglia Three projects.

Nevertheless, at Deadline 6, the Applicant incorporated the RSPB kittiwake tagging data into its assessment to inform the estimates of connectivity between the Flamborough and Filey Coast SPA and the Project. It concluded that a precautionary upper value of 26.1% of kittiwakes at the Project could be

[24] Furness, R.W. (2015) *Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Populations Scales (BDMPS).* Natural England Commissioned Report Number 164. 389 pp.

from the Flamborough and Filey Coast SPA adult (breeding) population and considered this to be a precautionary figure as it does not allow for the presence of breeding adults from closer colonies, nor of Russian and Norwegian immatures. The Applicant refuted NE's suggestion that a wider range of possible breeding season connectivity percentages should be considered (including up to 100% of birds at the Project during the breeding season being treated as birds from the Flamborough and Filey Coast SPA) [REP6-021].

The 26.1% breeding season apportioning rate was further justified by the Applicant in the Deadline 7 revised assessment (see below); NE was unable to comment on this justification before publication of the RIES. However, it advised [REP7-075] the Applicant to present data on the proportions of adult kittiwakes recorded in their baseline surveys in order to provide some level of confidence in the assumption that kittiwakes in the breeding season at NV would be predominantly immatures. It continued to advise presentation of a range of apportionment rates due to the difficulties in determining an apportionment figure. It highlighted concerns that the 26.1% value was not suitably precautionary and considered the 86% value obtained from the SNH tool should be applied by the Applicant.

The RSPB [REP6-038] also did not agree with the apportioning rates used by the Applicant and was concerned with the assumption of a 250 km foraging range given that the current maximum foraging range is 350 km (based on recent tag recoveries). It suggested [REP7-083] doubling the Applicant's 26.1% value would be a reasonable approach; it therefore based its conclusions on that value.

At Deadline 8 the Applicant also provided a review of kittiwake demographic and distribution data [REP8-067] to explore the likely proportions of adult (breeding) and immature birds present at sites offshore and in relation to proximity to breeding colonies in the Southern North Sea.

4.3.3.3 Gannet to Flamborough and Filey Coast SPA

The HRAR [APP-045] apportioned 100% of the total collisions to the Flamborough and Filey Coast SPA in the breeding season. However, NE [RR-106] noted that only the migration-free breeding season (May to July) had been used for gannet assessments. It advised [RR-106][REP1-088] that as the Project is located within the mean-maximum foraging range of gannets from the Flamborough and Filey Coast SPA colony, the breeding season should be defined as the full breeding season presented in Furness (2015); this could alter the number of collisions in each season and hence the overall annual figure apportioned to the Flamborough and Filey Coast SPA. This concern was shared by RSPB [RR-197][REP1-112].

The Applicant (response to Q23.36 [REP1-007]) noted differences in the interpretation of the breeding season amongst studies. It justified the use of the migration-free breeding season on the basis that tracking data suggests gannets breeding at Flamborough and Filey Coast SPA do not normally forage in the vicinity of the Project. It stated that peak gannet numbers seen at the Project occur during autumn migration but are most likely to be birds from different colonies; and that gannet numbers at the Project during breeding season are low and most likely to be birds migrating through the area rather than breeding adults from Flamborough and Filey Coast SPA.

Nevertheless, the Applicant stated that using the Furness (2015) breeding season of March to September, there would be an increase in background mortality by 0.36% and stated that this would not alter the conclusions. The Applicant also applied the JNCC breeding season of May to September and concluded that this would result in slightly lower collision mortality than the Applicant had originally calculated.

For autumn and spring, the HRAR apportioned 4.2% and 5.6% of the total collisions to the Flamborough and Filey Coast SPA, respectively. The Applicant (response to Q3.11 [REP1-007]) confirmed that the gannet BDMPS used in the non-breeding season apportionment of gannets to the Flamborough and Filey

Coast SPA were those presented in Furness (2015). However, NE [REP2-037] stated that it did not calculate the same apportionment figures as the Applicant and advised figures of 4.8% for autumn and 6.2% for spring (which were slightly higher than those used by the Applicant of 4.2% for autumn and 5.6% for spring). It considered that if the Applicant wishes to use their preferred values, clarification was required as to how they were calculated [REP2-036][REP3-051][REP4-062].

NE [RR-106] also raised concerns that the Applicant had applied a colony figure of birds of all ages in the gannet apportionment. It noted that as the existing PVAs were on adult currency, the calculations of baseline mortality should also be undertaken on adult currency. The Applicant (response to Q3.11 [REP1-007]) confirmed that it had used an all ages survival rate and that if an adult mortality rate was used, this would increase background mortality by 0.06% and 0.024% - below the 1% increase threshold at which effects are considered detectable and therefore would not alter the conclusions of the assessment.

The Applicant (Q23.72 of [REP4-040]) explained its approach to seasonal apportionment followed that adopted for the Dogger Bank Creyke Beck, Dogger Bank Teesside and East Anglia Three projects.

By the close of Examination, NE and the Applicant agreed that the methods used to define seabird breeding seasons were appropriate [REP9-046].

4.3.3.4 Razorbill to Flamborough and Filey Coast SPA

NE [REP7-075] advised that data in Appendix A of Furness (2015) should be used for the relevant species BDMPS for each season. It advised that razorbill abundance figures for NV East and NV West were incorrect and that the Applicant should update the assessment using the following apportionment rates before conclusions can be drawn:

- 3.4% for autumn/post-breeding season;
- 2.7% for winter/non-breeding season; and
- 3.4% for spring/pre-breeding season.

Subsequently [REP8-069], the Applicant revised the assessment based on the NE preferred apportionment rates.

4.3.3.5 Guillemot to Flamborough and Filey Coast SPA

NE advised the Applicant apportioned 100% for projects within mean maximum foraging range (Teesside, Westermost Rough, Humber Gateway, Triton Knoll), 46.3% for Hornsea Project One and Hornsea Project Two; 35% for Dogger Bank Creyke Beck and Dogger Bank Teesside. It advised a non-breeding season apportionment rate of 4.4%.

The Applicant presented a revised assessment on displacement of guillemots based on the NE preferred apportionment rates [REP8-069].

4.3.3.6 Puffin to Flamborough and Filey Coast SPA

NE advised the Applicant should apportion:

- 100% for projects within mean maximum foraging range (Humber Gateway, Teesside, Westermost Rough, Triton Knoll), except for Hornsea Project Two where 38% apportioning applied based on proportion of adults in baseline surveys during the breeding season;
- 38% for Hornsea Project One;
- 30% for Dogger Bank Creyke Beck and Dogger Bank Teesside; and
- 50% for Hornsea Project Three.

The Applicant presented a revised assessment on displacement of puffins based on the NE preferred apportionment rates [REP8-069].

4.3.4 Population Models

4.3.4.1 Gannet and Kittiwake at Flamborough and Filey Coast SPA

In considering the implications of collision mortality from the Project in-combination with other plans or projects, the Applicant referred to threshold levels of annual mortality that gannet and kittiwake populations could sustain, derived using Potential Biological Removal ("PBR") [APP-045].

Both NE [RR-106][REP1-088] and RSPB [RR-197][REP1-112][REP4-070] argued against the use of PBR, recommending that Population Viability Analysis ("PVA") is used as an alternative as it allows the effects of factors such as density dependence, population trends and demographic parameters to be investigated and enables comparison of the change in population size with and without a wind farm project.

The Applicant explained that the PBR outputs had been referred to as an additional source of predictions about population consequences but are not relied upon to support the assessment (Q3.3 [REP2-044]).

In reaching its conclusions the Applicant had referred to the PVA model undertaken for the Hornsea Project Two (paragraphs 213 and 248 of [APP-045]). NE [RR-106][REP1-088] and the RSPB [REP1-112] argued that the PVA model was not adequate and listed a number of issues with the modelling approach.

The Applicant (Q23.26 of [REP1-007]) noted that the PVA models had previously been considered robust and explained that NE's advice had changed regarding how models are run and how results are presented. It asserted that that the models remain reliable, despite being produced before NE adopted the matched-pair advice. It argued (Q23.27 [REP2-004]) that:

- Since the models were produced, the cumulative effects have not increased beyond the span of mortalities assessed and therefore the results remain valid; and
- The methods used are either identical, or very slightly modified, when compared with those currently recommended by NE and therefore there is no justification for model revisions.

The Applicant further referred to the updated PVA produced for the Hornsea Project Three which presented a comparison of outputs obtained with NE's preferred 'matched run' methods with the previous 'non-matched runs' and demonstrated that there is no difference in the median (or mean) result. The Applicant considered this reduced NE's justification to revise the PVA and that the remaining aspects which NE raised were not sufficient to warrant re-running the PVA.

Nevertheless, NE [REP4-062] continued to argue that the PVA results referred to by the Applicant are not reliable and advised consideration of outputs from PVA models should be presented for any impacts where background mortality rate is increased by more than 1% [REP4-051]. It advised that updated PVA may be required for species/populations for which current outputs were not conducted following current guidance to use a matched run approach, with counterfactual outputs and for a 30-year simulation period and that PVAs for Hornsea Project Three could be used to support the assessment.

Both RSPB [REP6-038] and NE [REP6-032][REP7-075] advised that density independent models should be used to interpret the population scale impacts of the CRM.

The Applicant acknowledged the challenges in estimating density dependence, however considered this did not prevent exploration of alternative methods for simulating density dependence in PVA models ([REP7-059]). Its Deadline 6 and Deadline 7 updated assessments [REP6-021] and [REP7-062]

presented both density dependent and density independent values to enable the difference in predictions to be seen. The Applicant used the Hornsea Project Three PVA for Flamborough and Filey Coast SPA.

NE clarified its position with regard to use of density dependent population models in that it was not the case that NE advised that density dependent regulation should be excluded from PVA models but where there is no clear evidence to support the application of any particular form or magnitude of density dependence in a given model, NE based its advice on the outputs of the density independent PVA model, as these make no assumptions about the form or strength of any density dependent effects.

The ExA considered that there is currently insufficient certainty about exactly how density dependence operates within the relevant populations. Until more detailed analysis of the factors governing density dependence is available the ExA considered it prudent to use a density independent approach.

In response to a request by the Secretary of State during the redetermination of the Project, the Applicant provided updated PVA modelling for the qualifying features of the Flamborough and Filey Coast SPA, which included modelling for gannet and kittiwake[25].

4.3.4.2 Lesser Black-backed Gull to Alde-Ore Estuary SPA

For lesser black-backed gull, the Applicant originally proposed to refer to the PVA produced for the Galloper wind farm. However, NE [RR-106] argued that the Galloper PVA model was not adequate due to several issues with the models. It advised that these issues should be considered by the Applicant before any conclusions can be made regarding the significance of in-combination collision impacts on lesser black-backed gull.

RSPB also recommended that a that a full assessment, including PVA, should be carried out [RR-197][REP1-110][REP1-112].

The Applicant therefore developed a PVA for the lesser black-backed gull population [REP6-020] at Deadline 6 using demographic rates taken from a review conducted by British Trust for Ornithology ("BTO") and run 1,000 times for both density dependent and density independent versions. NE [REP7-075] confirmed that the model had been run as per its advice. However, it advised that a larger number of simulations would potentially be needed to generate reliable results (i.e. 5,000 simulations) and requested the Applicant to set out how it had calculated the metrics. NE did not consider there was evidence to support the Applicant's assumption that baseline population growth would be in excess of 10% and stated that it could not validate the Applicant's conclusion.

At Deadline 7, the Applicant provided updated graphs of counterfactuals of population size and population growth rate, estimated across 5,000 simulations and the inclusion of 95% confidence intervals to respond to NE's concerns [REP7-063].

The RSPB [REP7-083] also undertook its own calculations presenting Counterfactuals of Population size as percentage reduction in population after 30 years. It concluded that in-combination mortality has the potential to cause significant declines in the Alde-Ore Estuary SPA lesser black-backed gull population and that an adverse effect on integrity cannot be excluded as result of predicted in-combination collision mortality with other plans or projects.

Although NE had some reservations over the PVA models for lesser black-backed gull, it considered that they represent the best available evidence on which to base an assessment [REP8-104].

[25] Vattenfall (2021). *Norfolk Vanguard Offshore Wind Farm Updated Population Viability Analysis: Flamborough and Filey Coast SPA.* Doc. Ref: ExA.AS-2.D12.V1. 25 August 2021.

4.3.5 Consideration of Fishing in-combination

The Applicant's assessment considered fishing as part of the environmental baseline. However, The Wildlife Trusts ("TWT") [RR-172][REP1-062][REP1-123][REP3-063] considered that fishing should not be part of the baseline but should be included in the in-combination assessment for all offshore European sites as a 'project'. It considered the Waddenzee [2004] ECR judgement and Defra policy supported this position.

In response, the Applicant [REP3-004] referred to the (at the time) draft HRA for the Review of Consents ("RoC") for the Southern North Sea SAC from which it inferred that the inclusion of commercial fisheries would have no effect on the conclusions reached in the in-combination assessment. It also referred to NE's response to a similar question on Hornsea Project Three which it considered suggested that commercial fisheries would usually be captured as part of baseline unless activity is too variable to be adequately affected. The Applicant did not update its assessment as requested by TWT.

On the authority of C127/02 Waddenzee [2004] ECR I-7405 the Secretary of State accepts that fishing is a plan or project that should be subject to assessment each time an application for a licence is considered. From a technical point of view, each new fishing licence renewal is a new plan or project and he therefore accepts that the potential for new fishing plans or projects should be considered in any in combination assessment.

However, from a practical point of view, if the effects of the on-going activity have already been assessed in the baseline then it would not serve the purpose of the legislation to assess the effects of a continuing, existing activity for a second time unless there is evidence to suggest that a new licence is being applied that will seek to intensify or extend the fishing.

As the Secretary of State has no such evidence and no indication of future fishing activity, he concludes that fishing activity should not be considered as an in combination effect.

4.3.6 Consideration of Hornsea Project Three and Thanet Extension in-combination

Due to the uncertainty around the final parameters of some future projects, the Secretary of State considers that the impacts of collision and displacement on birds should be limited to offshore windfarms that are operational, under-construction, consented, or in determination. Whilst several projects have issued PEIRs, the predicted bird mortality figures are subject to change and there is a high level of uncertainty in any assessment which includes these figures. This was acknowledged by Natural England in their final consultation response[26].

The HRAR [APP-045] utilised 'preliminary estimates' of collision mortality for Hornsea Project Three and Thanet Extension wind farms. The Applicant updated the in-combination assessment [AS-006], following submission of DCO applications for these projects, stating that the overall conclusion of no adverse effect on integrity remains.

The provision of the revised in-combination assessment was welcomed by NE. However, they noted methodological issues and uncertainties associated with the baseline data and assessments completed by Hornsea Project Three and some methodological issues identified with the assessments for Thanet Extension. On that basis NE was unable to reach conclusions on the scale of in-combination displacement and collision risk impacts [RR-106][REP1-088][REP2-038].

[26] Natural England (2021): *Appendix 6: Natural England Advice on Flamborough and Filey Coast (FCC) SPA PVAs and In-combination Assessments.* 19th November 2021.

NE subsequently confirmed [REP6-032] that the Hornsea Project Three Examination had closed on 2 April 2019 and that due to insufficient baseline surveys it is not possible to rule out an adverse effect on integrity from the Project. It therefore advised the Applicant to ensure that the assessment and figures presented for the Project alone are as robust as possible and that the Applicant should consider opportunities to minimise the Project alone impacts as much as possible. It suggested the Applicant could base their in-combination assessment on where there is some degree of certainty in the figures presented, e.g. for East Anglia Three cumulative totals, and then adding the figures for both the Project and Thanet Extension. The Applicant could also run a separate assessment which includes Hornsea Project Three and present both figures. The RSPB [REP6-038] supported NE's concerns regarding the baseline data and their recommended approach to the use of Hornsea Project Three figures.

The Applicant's updated in-combination assessments [REP6-021], which was subsequently replaced by [REP7-062], therefore comprised two sets, one including and one excluding the Hornsea Project Three datasets (from the Hornsea Project Three Environmental Statement). They also included Thanet Extension values from the Thanet Deadline 3 submission.

Ørsted (the Hornsea Project Three Applicant) argued [REP7-081] that its ornithological baseline is robust, and its assessment is highly precautionary; therefore, it considered an adverse effect on integrity could be excluded for the Hornsea Project Three Project. It did not agree that there is any basis upon which to depart from the normal approach of assessing in-combination effects and that until the Hornsea Project Three is determined, it must be considered within the Project in-combination assessment.

On 2 June 2020, the Secretary of State refused development consent for the application by Vattenfall Wind Power Limited for the Thanet Extension Offshore Wind Farm under s114(1)(b) of the PA2008 and an Order was not made. In-combination impacts from Thanet Extension therefore no longer need to be considered.

Upon request from the Secretary of State, the Applicant's updated collision and displacement modelling for the Flamborough and Filey Coast SPA incorporated the latest Hornsea Project Three ornithology survey data and project parameters[27]. The ornithological figures provided for the final Hornsea Project Three offshore wind farm were accepted by NE.

[27] Vattenfall (2021). *Norfolk Vanguard Offshore Wind Farm Updated Population Viability Analysis: Flamborough and Filey Coast SPA.* Doc. Ref: ExA.AS-2.D12.V1. 25 August 2021.

5 Appropriate Assessment

5.1 Appropriate Assessment: Alde-Ore Estuary SPA

The Alde-Ore Estuary SPA covers 2,417 ha on the Suffolk coast. It is approximately 92 km from the Project.

The site qualifies as an SPA under by regularly supporting the following populations of Annex I species of European importance: breeding populations of little tern, marsh harrier and Sandwich tern; and avocet (breeding and wintering). The site also qualifies through supporting two Annex II species: wintering redshanks, breeding lesser black-backed gull, a breeding seabird assemblage of international importance, and a wintering waterbird assemblage of international importance[28].

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.

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 the lesser black-backed gull feature from collision mortalities alone and in-combination with other plans or projects, 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; and
- Reducing predation and disturbance caused by native and non-native predators.

5.1.1 Lesser Black-backed Gull: Alone

During Examination the Applicant's final collision risk modelling ("CRM") and assessment [AS-048 and AS-049] used a breeding season apportionment rate of 17% and predicted that most collisions would occur during the second half of the breeding season and during early autumn (June to August). It calculated:

- Up to 2.9 collisions for the full breeding season (35.1 using the upper 95% CI); and
- This would result in an increase in mortality of 0.6% (1.3% using the upper 95% CI).

The Applicant concluded that the annual number of collisions at the Project is very small and would not materially alter the natural mortality rate for the population. As the increased mortality predicted as a result of mean collisions at the Project is below the threshold of 1% at which increases in mortality are detectable, and the upper confidence limit only just exceeds this level, it concluded that there would be

[28] http://publications.naturalengland.org.uk/publication/5170168510545920

no adverse effect on integrity of the Alde-Ore Estuary SPA as a result of lesser black-backed gull collisions from the Project alone.

NE [REP8-104] based its own calculations on the 10-30% seasonal apportionment range. It acknowledged that a breeding season apportionment of 30% is likely to be overly precautionary and that using this rate the collision prediction only just exceeds 1% of baseline mortality. NE therefore agreed with the Applicant that there would be no adverse effect on integrity for the lesser black-backed gull for collision impacts from the Project alone. The ExA agreed with this assessment.

Following Examination, the Applicant carried out CRM based on the revised turbine layout and specification, namely a reduction in the number of turbines from 180 to 158 and an increase in minimum draught height to at least 30 m above MHWS. The results from the revised modelling, based on the NE preferred approach, predict a total of between 2.1 (CI 0.7 - 5.8) for the 11.55 MW turbine and 2.6 (0.1-7.1) for the 14.7 MW turbine option (Vattenfall 2020a)[29]. This is a 46% decrease in the predicted number of collisions at the close of Examination.

Both NE and RSPB welcomed the revised wind farm layout and turbine parameters and agreed that there would not be an adverse effect on integrity for lesser black-backed gull of the Alde-Ore Estuary SPA[30] [31].

Having considered the number of predicted mortalities, the Secretary of State agrees that an adverse effect on the integrity of the Alde-Ore Estuary SPA from the effects of the Project alone on the lesser black-backed gull feature can be excluded.

5.1.2 Lesser Black-backed Gull: In-combination

At the end of Examination, the Applicant's final CRM and assessment [AS-048] calculated:

- An annual mortality of 35 (25.6 using as-built wind farm designs);
- An increase in mortality of 7.6% (5.5% using as-built wind farm designs); and
- With a worst-case adult mortality of 40, the population growth rate would be 1.3% lower than the baseline (density independent) or 0.4% (density dependent) (<0.9% using as-built wind farm designs).

The Applicant considered that the reduction in growth rate is very unlikely to have a detectable effect on the population and that the breeding success and hence population trend of lesser black-backed gull appeared to be mainly determined by the amount of predation, disturbance and flooding at the site. The Applicant ultimately concluded that there would be no adverse effect on integrity from collision impacts on lesser black-backed gull in-combination with other plans or projects.

In undertaking its own calculations, NE [REP8-104] produced an annual in-combination total of 39 lesser black-backed gull collisions per year.

NE advised [REP8-104] that the Alde-Ore lesser black-backed gull population is at best currently stable. It concluded that if the additional mortality from the wind farm is 35 - 40 adults per annum, then the population growth rate would be reduced by 0.9 - 1% which, assuming that the population is stable, would mean that the population would be 22.5-25.2% lower than the current population size; this would result

[29] Vattenfall (2020a). Norfolk Vanguard Offshore Wind Farm Additional Mitigation Department for Business, Energy and Industrial Strategy (BEIS) Request for information. Doc. Ref: ExA; Mit; 11.D10.2. 28 February 2020.

[30] Natural England (2020). *Norfolk Vanguard Offshore Wind Farm post examination consultation. Planning Inspectorate Reference: EN010079.* 27th April 2020.

[31] RSPB (2020). *Written Submission for The Royal Society for the Protection of Birds. Response to the Secretary of State's December 2019 Consultation*. 27 February 2020.

in the population declining below its current level. It stated that the population is likely to be hindered from restoration to target levels even when more optimistic assumptions about the population trend of the colony are made. Therefore, NE advised that it is not possible to rule out an adverse effect on integrity of the lesser black-backed gull feature of the Alde-Ore Estuary SPA for collision impacts in-combination with other plans or projects, and that the Project makes a meaningful contribution to the in-combination effects. [REP8-104 and REP9-057].

The RSPB [REP8-109] also did not agree an adverse effect on integrity from in-combination collision mortality could be ruled out and considered that the population reduction after 30 years would be 31%.

The ExA was not persuaded that an adverse effect on integrity on the lesser-black backed gull of the Alde-Ore Estuary SPA from in-combination collision risk can be excluded.

Both NE and RSPB maintained that an adverse effect on integrity cannot be ruled out [32] [33].

The Secretary of State has considered the different potential outcomes of the population models and in relation to in-combination effects, 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 therefore concludes that an adverse effect on the integrity of the Alde-Ore Estuary SPA from the effects of the Project in combination with other plans or projects on lesser black-backed gull from collision mortality cannot be excluded.

5.2 Appropriate Assessment: Breydon Water SPA and Ramsar Site

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. It is located 53 km from the Project.

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[34].

Breydon Water Ramsar site, 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[35].

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 above listed features alone and in-combination with other plans or projects due to the potential for migrating birds to collide with turbines during the operational phase of the Project.

[32] Natural England (2020). *Norfolk Vanguard Offshore Wind Farm post examination consultation. Planning Inspectorate Reference: EN010079.* 27th April 2020.

[33] RSPB (2020). *Written Submission for The Royal Society for the Protection of Birds. Response to the Secretary of State's December 2019 Consultation*. 27 February 2020.

[34] http://publications.naturalengland.org.uk/publication/6376690053808128

[35] https://rsis.ramsar.org/ris/821

5.2.1 All Features: Alone

5.2.1.1 Collision risk to migrating Birds

The Applicant provided a document called migrant non-seabird collision risk modelling [REP6-022]. The species assessed were those that are considered to have the potential to cross the Project array area. The list of species were agreed to be appropriate by NE. Only golden plover (1.1 collisions per annum) and lapwing (1.2 collisions per annum) attributed to the Breydon Water SPA were predicted to result in more than one collision. Such low numbers meant that background mortality would not go over the 1% threshold, which would ordinarily require the Applicant to undertake further population modelling. On this basis NE agreed that there would be no adverse effect on site integrity. The ExA agreed with this conclusion.

The Secretary of State is satisfied that the above assessment is appropriate. He agrees with the Applicant, NE and the ExA and concludes that an adverse effect on the integrity of the Breydon Water SPA and Ramsar site from the effects of the Project alone on collision mortality to migrating birds can be excluded.

5.2.2 All Features: In-combination

5.2.2.1 Collision risk to migrating Birds

At the request of NE, the Applicant also considered the combined mortality of the Project and East Anglia Three offshore wind farm. However, whilst a slight increase was predicted, the increase in background mortalities remained below the 1% threshold. On this basis NE agreed that there would be no adverse effect on integrity in-combination. The ExA agreed with this conclusion.

The Secretary of State is satisfied that the above assessment is appropriate. He agrees with the Applicant, NE and the ExA and concludes that an adverse effect on the integrity of the Breydon Water SPA and Ramsar site from the effects of the Project in combination with other plans or projects on collision mortality to migrating birds can be excluded.

5.3 Appropriate Assessment: Broadland SPA and Ramsar Site

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 SPA and Ramsar site are located approximately 53 km from the Project.

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[36].

Broadland Ramsar site, 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[37].

[36] http://publications.naturalengland.org.uk/publication/5310905998901248

[37] https://rsis.ramsar.org/ris/68

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 an likely significant effect due to the potential for impacts to occur on *ex-situ* habitats (i.e. habitats outwith the SPA, but used by mobile SPA/Ramsar features) during construction. A likely significant effect has also been identified due to the potential for migrating birds to collide with turbines during operation.

5.3.1 Impacts to *ex-situ* habitats: Alone

The Applicant's HRAR [APP-045] noted that wintering qualifying features of the Broadland SPA are likely to utilise a range of supporting habitats outside the boundary of the SPA (*ex-situ* habitats) over the winter months. However, wintering bird surveys of the *ex-situ* habitats recorded waterbird counts that are not of national or greater importance, or a significant component of the Broadland SPA and Ramsar [APP-045][AS-044]. The Applicant considered that the wintering bird survey baseline collected in 2016/2017 is sufficient to conclude that the qualifying features of the Broadland SPA and Ramsar site are not present within functionally-linked land located within an identified study area (comprising land located both within 5 km of the Broadland SPA and Ramsar site and 300 m of the onshore project area.

However, NE requested an assessment of impacts of cropping rotation on bird species to confirm whether the low numbers of birds in the Applicant's survey was due to the cropping regime of that particular year or genuinely represents low usage of those areas. NE advised that mitigation would be required in terms of crop rotations that would be in place at the time of construction. [RR-106][REP5-017][REP6-032].

The Applicant [REP1-007] considered that the majority of crops were in place over winter within the wintering bird survey area and therefore the surveys provided a robust estimate of the use of these habitats by qualifying features of the Broadland SPA and Ramsar site. It explained that a single year of surveys was agreed with NE during the evidence plan process; this was acknowledged by NE [REP5-017].

Notwithstanding the above the Applicant later stated that, following consent, it would potentially undertake a second year of wintering bird surveys and undertake an assessment of predicted crop patterns to re-assess the potential bird use of the affected areas. Should it be required, suitable alternative foraging opportunities will be provided (by introducing feed) for potentially displaced qualifying species associated with Broadland SPA/Ramsar site elsewhere within the Order limits or (subject to separate landowner agreements) within nearby fields. The Applicant also stated that, alternatively, it may progress to delivering the additional suitable foraging opportunities without the additional survey work. This was captured in the Outline Landscape and Ecological Management Strategy ("OLEMS") [REP9-014].

NE subsequently agreed that there would be no adverse effect on integrity for features of the SPA/Ramsar due to impacts on *ex-situ* habitats [REP9-046][REP9- 057]. The ExA agreed with this conclusion.

The Secretary of State is satisfied that the above assessment is appropriate and concludes that an adverse effect on the integrity of the Broadland SPA and Ramsar site from the effects of the Project alone on *ex-situ* habitats affecting overwintering birds can be excluded. His conclusion is strengthened by the provision of additional suitable foraging opportunities for SPA/Ramsar features (if necessary), as captured in the OLEMS, which the Applicant's Ecological Management Plan must accord with (Requirement 24 of the DCO).

5.3.2 Impacts to *ex-situ* habitats: In-combination

No other plans or projects were identified that could contribute to an in-combination effect.

On this basis, the Secretary of State concludes that adverse effects on the integrity of the Broadland SPA and Ramsar site from the effects of the Project in-combination with other plans or projects on *ex-situ* habitats affecting overwintering birds, can be excluded.

5.3.3 Collision risk to migrating birds: Alone

The Applicant provided a document called migrant non-seabird collision risk modelling [REP6-022]. The species assessed were those that are considered to have the potential to cross the Project array area. The list of species were agreed to be appropriate by NE. No species attributed to the Broadland Water SPA were predicted to result in more than one collision per year. Such low numbers meant that background mortality would not go over the 1% threshold, which would ordinarily require the Applicant to undertake further population modelling. On this basis NE agreed that there would be no adverse effect on integrity. The ExA agreed with this conclusion.

The Secretary of State is satisfied that the above assessment is appropriate. He agrees with the Applicant, NE and the ExA and concludes that adverse effects on the integrity of the Broadland SPA and Ramsar site, from the effects of the Project alone on collision mortalities to migrating birds can be excluded.

5.3.4 Collision risk to migrating birds: In-combination

At the request of NE the Applicant also considered the combined mortality of the Project and East Anglia Three offshore wind farm.

Whilst a slight increase in mortality was predicted, the increase remained below the 1% background mortality threshold. On this basis NE agreed that there would be no adverse effect on integrity in-combination. The ExA agreed with this conclusion.

The Secretary of State is satisfied that the above assessment is appropriate. He agrees with the Applicant, NE and the ExA and concludes that adverse effects on the integrity of the Broadland SPA and Ramsar site from the effect of the Project in-combination with other plans or projects on collision mortalities to migrating birds can be excluded.

5.4 Appropriate Assessment: Flamborough and Filey Coast SPA

The Flamborough and Filey Coast SPA is a coastal site covering an area of approximately 8,040 ha which spans the East Riding of Yorkshire, North Yorkshire and Scarborough. Its marine extent covers approximately 7,472 ha and it is located approximately 200 km from the Project. The SPA citation has a designated kittiwake population of 44,520 pairs in addition to gannet (8,469 pairs), guillemot (41,607 pairs) and razorbill (10,570 pairs), and a breeding seabird assemblage of 215,750 individuals. As part of a breeding seabird assemblage the SPA also supports 1,447 pairs of fulmar (a listed component of the assemblage) and 980 pairs of puffin (a non-listed component of the assemblage)[38].

In addition to the generic conservation objectives for SPAs presented in Section 4.1., NE has provided supplementary conservation objectives for the individual qualifying features of the site[39], which include:

[38] http://publications.naturalengland.org.uk/publication/5400434877399040

[39]https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9006101&SiteName=flamb&SiteNameDisplay=Flamborough+and+Filey+Coast+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4

- 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 (16,938 adults), 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; and
- Maintaining the diversity of the seabird assemblage: the total number of species should not be reduced.

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. The Secretary of State has identified a potential likely significant effect from the Project alone and in-combination due to the risk of collision leading to mortality for kittiwake and gannet populations, and displacement leading to mortality for razorbill, guillemot, puffin and gannet populations during the operational phase.

5.4.1 Kittiwake Collision Mortality: Alone

Using the 26.1% breeding season apportioning rate, the Applicant calculated [AS-048]:

- The maximum annual collisions apportioned to the Flamborough and Filey Coast SPA using the full breeding season is 9.6; and
- This would increase mortality rate by 0.07%.

The Applicant concluded that this would be undetectable against natural variation and there would be no adverse effect on integrity from the Project alone.

NE [REP8-104] undertook its own calculations applying an 86% breeding season apportionment rate. It calculated:

- An annual total of 43 kittiwake collisions (CI 2 - 120); and
- An increase in baseline mortality of 0.33% (CI 0.02% - 0.93%) using the designated population, or 0.29% (CI 0.02-0.80%) using the mean 2016 - 2017 population.

Despite the differences compared to the Applicant's figures, NE advised that a conclusion of no adverse effect on integrity of the kittiwake feature of the Flamborough and Filey Coast SPA from collision risk from the Project alone can be reached [REP8-104][REP9-046].

The RSPB also agreed that a conclusion of no adverse effect on integrity for the kittiwake population of Flamborough and Filey Coast SPA due to collisions from the Project alone was appropriate [REP8-089][REP8-109].

Subsequent to Examination, the Applicant updated the CRM to account for the reduction in the number of turbines and changes in the turbine parameters. The results from the modelling reduced the predicted number of kittiwake collisions by 50%, from the 43.8 (CI 2.0 - 120.0) at the end of Examination to between 13.9 (CI 1 - 39.9) and 21 (CI 1.2 - 60.2) depending on the final turbine size.

Both NE and RSPB agreed that there would not be an adverse effect on integrity from the Project alone for kittiwake of the Flamborough and Filey Coast SPA[40] [41].

In view of the predicted number of collisions from the Project alone the Secretary of State concludes that adverse effects on the integrity of the Flamborough and Filey Coast SPA from the effects of the Project alone on kittiwake collision mortalities, can be excluded.

5.4.2 Kittiwake Collision Mortality: In-combination

Throughout the Examination, NE advised [REP2-038][REP4-062][REP6- 032][REP8-104] that the in-combination threshold for kittiwake from Flamborough and Filey Coast SPA had already been reached for previous offshore wind farms, dating back to the Hornsea Project Two Examination; consequently, all subsequent projects would continue to add to this cumulative collision total.

Nevertheless, the Applicant's revised assessment [AS-048] concluded no adverse effect on integrity from in-combination collision mortality to kittiwakes of Flamborough and Filey Coast SPA. It calculated:

- An in-combination total, all age class, annual Flamborough and Filey Coast SPA kittiwake population collision estimate of 490 individuals (332.1 individuals without Hornsea Project Three); and
- An increase in background mortality of 3.8% (2.5% without Hornsea Project Three); and at an adult mortality of 500, a maximum reduction in the population growth rate of 0.6% (0.4% without Hornsea Project Three) using the density independent model and 0.1% (both with and without Hornsea Project Three) using the density dependent model.

The Applicant concluded that this would represent a very small risk to the population's conservation status. It concluded that there is a small risk that further population growth would be restricted when considering a density independent model, but that the density dependent model (which argued to be appropriate) suggests only a very slight reduction in the growth rate. The Applicant concluded that there would be no adverse effect on integrity on the Flamborough and Filey Coast SPA from collision impacts on kittiwake due to the Project in combination with other plans or projects.

By the close of Examination, NE [REP9-046] and RSPB [REP8-089] did not agree with the Applicant's conclusion. NE's own calculations and assessment of in-combination mortality, using a precautionary 86% breeding season apportionment rate and the density independent PVA outputs, were [REP8-104]:

- 547 annual collisions (366 without Hornsea Project Three);
- The population growth rate would be reduced by 0.6% (0.4% without Hornsea Project Three);
- The population of Flamborough and Filey Coast SPA after 30 years would be 15.1-16.5% lower than it would have been in the absence of the additional mortality (10.8% without Hornsea Project Three); and
- The Project's contribution to the in-combination total is 7.86% (11.76% without Hornsea Project Three).

NE's calculations were undertaken using a higher apportioning rate than the Applicant (86% compared to 26.1%) which has resulted in a greater number of in-combination collisions. However, both the

[40] Natural England (2020). *Norfolk Vanguard Offshore Wind Farm post examination consultation. Planning Inspectorate Reference: EN010079.* 27th April 2020.

[41] RSPB (2020). *Written Submission for The Royal Society for the Protection of Birds. Response to the Secretary of State's December 2019 Consultation*. 27 February 2020.

Applicant and NE have reached the same conclusion regarding the reduction in population growth rate regardless of the method applied (i.e., a 0.6% reduction with Hornsea Project Three).

The Applicant presented arguments [REP9-031] that the predicted 0.6% reduction in population growth was very minor compared to a trend of around 7% growth over the last 20 years.

NE concluded that both with or without Hornsea Project Three, in-combination collision mortality to kittiwake of Flamborough and Filey Coast SPA would be counter to the restore conservation objective for this feature at the site and that it could not advise beyond reasonable scientific doubt that this level of impact would not result in an adverse effect on integrity. It further considered that the Project makes a meaningful contribution to the in-combination effects [REP8-104][REP9-046][REP9-057].

The RSPB [REP7-083][REP8-089][REP8-109][REP9-063] similarly considered that an adverse effect on integrity exists from in-combination collision mortality irrespective of whether or not mortality from Hornsea Project Three is included. It argued that the Hornsea Project Three PVA demographic rates do not account for recent decline in kittiwake productivity at Flamborough and Filey Coast SPA and did not agree the population can be considered to be at favourable conservation status. It maintained that the breeding season apportionment is too low and disagreed over the Applicant's exclusion of NV East during the breeding season. NE [REP9-057] similarly was of the view that kittiwake could travel as far as NV East

The Applicant challenged NE's conservation objective to 'restore the population to 83,700' as the Applicant considered that the figure mistakenly identified the population as pairs when in fact it referred to individuals. The population in 1987 is reported to have been 83,700 pairs, subsequent counts have reported between 40,000 to 50,000 pairs; approximately half that counted in 1987. NE maintain the population count in 1987 is accurate and does relate to pairs and not individuals. Consequently, the conservation objective is to restore the population to 83,700 pairs[42].

During the redetermination of the Project, in response to a request for further information from the Secretary of State, the Applicant included in-combination collision risk totals to include the updated collision risk mortalities predicted for Hornsea Project Three, but excluding projects which had not submitted an application (i.e. those projects where only a PEIR report was available)[43]. The updated in-combination figures are as follows:

- 432 annual collisions (358 without Hornsea Project Three);
- The population growth rate would be reduced by 0.024% (0.025% without Hornsea Project Three);
- The population of Flamborough and Filey Coast SPA after 30 years would be 14.28% lower than it would have been in the absence of the additional mortality (12.01% without Hornsea Project Three); and
- The Project's contribution to the in-combination total is 4.86% (5.86% without Hornsea Project Three).

As part of their final consultation response, NE provided their advice on the in-combination assessment which included the revised collision mortality estimates for Hornsea Project Three[44]. The assessment

[42] Natural England (2020). *Norfolk Vanguard Offshore Wind Farm post examination consultation. Planning Inspectorate Reference: EN010079.* 27th April 2020.

[43] Royal HaskoningDHV (2021). *Norfolk Vanguard Offshore Wind Farm Updated Population Viability Analysis: Flamborough and Filey Coast SPA.* Doc. Ref: ExA.AS-2.D12.V1. 25 August 2021.

[44] Natural England (2021) *Natural England advice on Flamborough and Filey Coast (FFC) SPA PVAs and in-combination assessments*. 19th November 2021.

was based on the updated in-combination collision mortality figures presented by the Applicant, which excluded the contributions from Hornsea Project Four, Dudgeon Extension and Sheringham Shoal Extension.

NE confirmed that if the Hornsea Project Three contribution of 74 kittiwakes is included, then the in-combination mortality total is 432 kittiwakes from the Flamborough and Filey Coast SPA per year for all projects excluding Hornsea Project Four, Dudgeon Extension and Sheringham Shoal Extension. This predicted level of in-combination collision impact equates to more than 1% of baseline mortality of the colony.

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

The contribution from the Project to the in-combination collision total will be small, but the Secretary of State notes that the Habitats Regulations do not include any reference to the exclusion of small-scale effects, or to treating effects as *de minimis*. The relevant test in Regulation 63 of the Habitats Regulations is whether there would be effects from alone or in-combination with other projects. This implies that however small an effect is, it may still contribute to an adverse effect on integrity. The Secretary of State therefore concludes that an adverse effect on the integrity of the Flamborough and Filey Coast SPA from the effects of the Project in-combination with other plans or projects on kittiwake collision mortality cannot be excluded.

5.4.3 Gannet Displacement and Collision: Alone

5.4.3.1 Displacement

The Applicant submitted an assessment of displacement risk for gannet [REP6-021]. This presented a range of displacement rates between 60% and 80% displacement and 1% mortality. Apportioning 100% of gannet displacement mortality to the Flamborough and Filey Coast SPA and using NE's preferred rates in spring and autumn, it calculated:

- A worst-case mortality of between 2.5 and 3.3 birds per year; and
- This would result in an increase to the mortality rate by up to a maximum of 0.04% (designated population).

The Applicant and NE agreed that operational displacement of gannet from the Project alone would not have an adverse effect on integrity on Flamborough and Filey Coast SPA [REP8-104][REP9-046].2

The ExA was content that an adverse effect on integrity on the gannet feature of the Flamborough and Filey Coast SPA from displacement could be ruled out from the Project alone.

The Secretary of State is satisfied that the above assessment is appropriate. He agrees with the Applicant, NE and the ExA and concludes that adverse effects on the integrity of the Flamborough and Filey Coast SPA from the effects of the Project alone on gannet displacement can be excluded.

5.4.3.2 Collision

Using NE's preferred apportioning rates, the Applicant [AS-048] calculated that for the Project alone:

- Mortality would be 19.9 adults (5.8-39.2 using 95% CIs);

- This would increase mortality rate by 1.1% (designated count) (2.2% using 95% CIs) and 0.9% (2017 count) (1.8% using 95% CIs); and
- The maximum reduction in the population growth rate, at an adult mortality of 50, would be 0.2% using the density independent model (0.1% using the density dependent model).

The Applicant concluded that the collisions attributed to the Flamborough and Filey Coast SPA are not at a level which would trigger a risk of population decline but would only result in a slight reduction in the growth rate seen at the colony and concluded no adverse effect on integrity from the Project alone.

NE [REP8-104] agreed with the apportioned figure of 20 gannet collisions per annum, however, it calculated a broader range of 1 to 56 collisions.

NE confirmed that the conservation objective for the gannet population of the Flamborough and Filey Coast SPA is to maintain the size of the breeding population at a level which is above 8,469 pairs (16,938 adults), whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent. The latest mean count is 24,594 adults based on the mean of the 2012, 2015 and 2017 counts. It advised that under a range of plausible future growth rate scenarios the colony would still be predicted to grow above the current mean population with the addition of collision mortality to Flamborough and Filey Coast SPA gannets from the Project alone. It therefore agreed an adverse effect on integrity can be excluded [REP8-104][REP9-046].

The RSPB also agreed with a conclusion of no adverse effect on integrity for gannet population due to collision from the Project alone [REP8-089][REP8-109].

The ExA was content that an adverse effect on integrity on the gannet feature of the Flamborough and Filey Coast SPA from collision mortality from the Project alone could be ruled out.

The Secretary of State is satisfied that the above assessment is appropriate. He agrees with the Applicant, NE and the ExA and concludes that adverse effects on the integrity of the Flamborough and Filey Coast SPA from the effects of the Project alone on gannet collision mortality can be excluded.

5.4.3.3 Collision and Displacement

The Applicant did not consider the combined impact of collision risk and displacement from the Project alone in its submissions in [AS-048] which NE calculated to be:

- 23 mortalities (range of up to 2-64);
- An increase of around 1% of baseline mortality of the colony;
- The population of Flamborough and Filey Coast SPA after 30 years would be 3.2% lower than in the absence of the additional mortality (6.4-9.4% lower using the upper range of 64 mortalities); and
- The population growth rate would be reduced by 0.1% (0.2-0.3% using the upper range of 64 mortalities).

NE confirmed that the conservation objective for the gannet population of the Flamborough and Filey Coast SPA is to maintain the size of the breeding population at a level which is above 8,469 pairs (16,938 adults), whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent. The latest mean count is 24,594 adults based on the mean of the 2012, 2015 and 2017 counts. It advised that under a range of plausible future growth rate scenarios the colony would still be predicted to grow above the current mean population with the addition of collision and displacement mortality to Flamborough and Filey Coast SPA gannets from the Project alone. It therefore agreed no adverse effect on integrity can be concluded. [REP8-104][REP9-046].

The ExA was content that an adverse effect on integrity on the gannet feature of the Flamborough and Filey Coast SPA could be ruled out from the Project alone.

The Secretary of State is satisfied that the above assessment is appropriate. He agrees with the Applicant, NE and the ExA and concludes that adverse effects on the integrity of the Flamborough and Filey Coast SPA from the effects of the Project alone on combined gannet displacement and collision mortality can be excluded.

5.4.4 Gannet Displacement and Collision: In-combination

5.4.4.1 Displacement

The Applicant's Deadline 6 assessment of displacement risk for gannet [REP6-021] calculated the total annual in-combination displacement mortality apportioned to the Flamborough and Filey Coast SPA to be between 49.1 and 65.5. This would result in an increase in background mortality of the Flamborough and Filey Coast SPA all age class population between 0.64% and 0.85% (designated) and between 0.53% and 0.70% (2017 population). The Applicant concluded there would be no adverse effect on integrity for the Flamborough and Filey Coast SPA gannet population due to in-combination displacement mortality.

The ExA was content that an adverse effect on integrity on the gannet feature of the Flamborough and Filey Coast from displacement from the Project in combination with other plans or projects.

The Secretary of State is satisfied that the above assessment is appropriate. He agrees with the Applicant, NE and the ExA and concludes that adverse effects on the integrity of the Flamborough and Filey Coast SPA from the effects of the Project in-combination with other plans and projects on gannet displacement can be excluded.

5.4.4.2 Collision

The Applicant's revised assessment [AS-048] concluded no adverse effect on integrity from in-combination collision mortality to gannets of Flamborough and Filey Coast SPA. It calculated:

- An in-combination total, all age class, annual Flamborough and Filey Coast SPA gannet population collision estimate of 231 individuals (212 individuals without Hornsea Project Three);
- An increase in background mortality of between 12.9% (designated population) and 10.6% (2017 count) (11.8% and 9.8% without Hornsea Project Three); and
- At an adult mortality of 250, a maximum reduction in the population growth rate of 1.1% (0.4% without Hornsea Project Three) using the density independent model and 0.7% using the density dependent model.

The Applicant concluded that in combination gannet collisions and displacement would result in a slight reduction in the growth rate currently seen at the colony but would not be at a level which would trigger a risk of population decline, therefore there would be no adverse effect on integrity of the SPA.

In considering in-combination effects without Hornsea Project Three, NE [REP8-104] advised that under a 1% colony growth rate scenario, the additional mortalities would result in a reduction from the current colony size, but above the breeding population size. Under a 2% to 5% growth rate scenario, the colony would be predicted to grow at about the current mean count. NE considered a growth rate as low as 1% would be unlikely, therefore agreed that an adverse effect on integrity of the gannet feature of the Flamborough and Filey Coast SPA can be ruled out for collisions impacts from in-combination with other plans or projects if Hornsea Project Three is excluded from the in-combination total.

However, during Examination, NE explained that it had significant concerns regarding the incomplete baseline surveys for Hornsea Project Three, and the associated level of uncertainty as regards the potential impacts of that project. NE therefore stated it was not in a position to advise that an adverse effect on integrity can be ruled out for the gannet feature of the Flamborough and Filey Coast SPA for collision in-combination with other plans or projects when Hornsea Project Three is included in the in-combination total.

RSPB similarly did not agree that an adverse effect on integrity can be excluded from in-combination collision plus displacement mortality to gannets when Hornsea Project Three is included [REP8-089][REP8-063].

The ExA noted that NE's position regarding adverse effect on integrity was due to concerns over the incomplete baseline surveys for Hornsea Project Three and the associated level of uncertainty of the potential impacts. On the basis of the uncertainty and information presented during Examination regarding the impacts from Hornsea Project Three, the ExA was unable to exclude an adverse effect on integrity from the Project in combination with other plans or project beyond reasonable scientific doubt.

During the redetermination of the Project, in response to a request for further information from the Secretary of State, the Applicant included in-combination collision risk totals to include the updated collision risk mortalities predicted for Hornsea Project Three, but excluding projects which had not submitted an application (i.e. those projects where only a PEIR report was available)[45]. The Applicant's conclusions from the assessment remained unchanged from those presented during the Examination in that there would be no adverse effect on integrity on the SPA.

The RSPB's final position was that an adverse effect on integrity could not be ruled out in-combination with other plans or projects[46].

In their final submission NE acknowledged the updated collision risk totals. Based on this information NE concluded that an adverse effect on integrity of the gannet feature of the Flamborough and Filey Coast could be ruled out for in combination collision impacts when all projects up to and including Hornsea Project Three, Norfolk Boreas, East Anglia One North and East Anglia Two are included in the in-combination totals[47].

The Secretary of State has considered the information presented by the Applicant and NE's conclusions regarding this. The Secretary of State concludes that an adverse effect on integrity of the Flamborough and Filey Coast SPA from the effects of the Project in combination with other plans or projects on gannet collision can be excluded.

5.4.4.3 Displacement and Collision

The Applicant further combined the annual in-combination gannet collision estimate to the in-combination annual displacement prediction to give:

- A combined SPA mortality estimate of 280 to 296; and

[45] MacArthur Green (2021): Updated Population Viability Analysis Flamborough and Filey Coast SPA. V1. 20th August 2021.

[46] The Royal Society for the Protection of Birds (2021). *Written Submission for the Royal Society for the Protection of Birds Annex 1 Flamborough and Filey Coast SPA.* 19 November 2021.

[47] Natural England (2021) *Natural England advice on Flamborough and Filey Coast (FFC) SPA PVAs and in-combination assessments*. 19th November 2021.

- At an adult mortality of 275 – 300, a maximum reduction in the population growth rate of 1.4% using the density independent model and 0.9% using the density dependent model.

It concluded that in-combination gannet collisions and displacement would result in a slight reduction in the growth rate currently seen at this colony but would not be at a level which would trigger a risk of population decline, and so would not have an adverse effect on integrity of the SPA. The Applicant also highlighted the precaution in its assessment.

NE [REP7-075] confirmed that the approach to the in-combination assessment had addressed its methodological concerns. It noted that combining predicted in-combination mortality from collision risk and displacement would equate to more than 1% of baseline mortality of the colony. It advised that at an adult mortality of 275 - 300 per annum, the population of Flamborough and Filey Coast SPA after 30 years would be 30.4 - 32.7% lower than it would have been in the absence of the additional mortality [REP8-104].

In considering in-combination effects without Hornsea Project Three, NE [REP8-104] advised that under a 1% colony growth rate scenario, the additional mortalities would result in a reduction from the current colony size, but above the breeding population size. Under a 2% to 5% growth rate scenario, the colony would be predicted to grow at about the current mean count. NE considered a growth rate as low as 1% would be unlikely, therefore agreed that an adverse effect on integrity of the gannet feature of the Flamborough and Filey Coast SPA can be ruled out for collisions plus displacement impacts from in-combination with other plans or projects if Hornsea Project Three is excluded from the in-combination total.

During the redetermination of the Project, as part of their final consultation response, NE provided an updated in-combination impact assessment for gannet[48]. The assessment was based on the updated in-combination collision mortality figures presented by the Applicant[49], which excluded the contributions from Hornsea Project Four, Dudgeon Extension and Sheringham Shoal Extension.

NE confirmed the in-combination collision mortality total is 293 gannets from the Flamborough and Filey Coast SPA per year for all projects excluding Hornsea Project Four, Dudgeon Extension and Sheringham Shoal Extension. This predicted level of in-combination collision impact equates to more than 1% of baseline mortality of the colony.

Furthermore, if mortality from the wind farms is 293 adults per year, then the population of the SPA after 30 years will be 33.2% lower than it would have been in the absence of the Projects and the population growth rate would be reduced by 1.3%.

NE confirmed that in-combination displacement mortality total for the worst-case scenario of 80% displacement and 1% mortality is 62 gannets from the Flamborough and Filey Coast SPA per year for all projects excluding Hornsea Project Four, Dudgeon Extension and Sheringham Shoal Extension. This predicted level of in-combination displacement impact equates to more than 1% of baseline mortality of the colony.

[48] Natural England (2021) *Natural England advice on Flamborough and Filey Coast (FFC) SPA PVAs and in-combination assessments*. 19th November 2021.

[49] Royal HaskoningDHV (2021). *Norfolk Vanguard Offshore Wind Farm Updated Population Viability Analysis: Flamborough and Filey Coast SPA.* Doc. Ref: ExA.AS-2.D12.V1. 25 August 2021.

Furthermore, if the displacement mortality from the wind farm is 62 adults per year, then the population of the SPA after 30 years will be 8.2% lower than it would have been in the absence of the Projects and the population growth rate would be reduced by 0.3%.

The combined in-combination impact of collision and displacement to gannet from the SPA is predicted to be up to 355 mortalities per year (293 from collisions and up to 62 from displacement). This would equate to more than 1% of baseline mortality of the colony.

If the in-combination mortality is 355 per year, then the population of SPA after 30 years will be 38.7% lower than it would have been in the absence of the projects and the population growth rate would be reduced by 1.6%. The future population growth rate of the SPA population is unknown, therefore NE considered the counterfactuals of final population size for the predicted future growth rates between 1% and 5% per year.

For in-combination collision and displacement mortalities of 355 gannets per year, the SPA colony would reduce from its current size of 24,594 adults (based on a growth rate of 1% and 1.3%) but would still be above the size of the 8,469 pairs or 16,938 adults. The colony would be predicted to continue to grow for any growth rate above 2% per year.

NE concluded that as the current annual growth rate of the colony is around 11%, the Flamborough and Filey Coast SPA gannet population is likely to be robust enough to allow the conservation objective to maintain the population at (or above) designation levels with the Project alone and in-combination with other projects.

The Secretary of State has considered the information presented by the Applicant and NE in light of the conservation objectives for the SPA and the growth of the gannet population. The Secretary of State is satisfied that an adverse effect on the integrity of the Flamborough and Filey Coast SPA from the effects of displacement and collision from the Project in-combination with other plans or projects on the gannet feature can be excluded.

5.4.5 Razorbill Displacement: Alone

During the Examination, NE raised concerns with the apportionment rates used by the Applicant [REP7-075] (as detailed in Integrity Matrix 2 of the RIES [PD-016]), which led the Applicant to provide a revised assessment in [REP8-069].

This calculated:

- Worst-case displacement mortality would be 5.8 adults (2.4 to 9.9 using the 95% CIs);
- This would increase the baseline mortality by 0.2% (0.1% to 0.4% using the 95% CIs), which is below the 1% threshold of detectability; and
- The maximum reduction in the population growth rate at a mortality of 50 would be 0.2% (density independent) which would represent a negligible risk for the population.

It is noted that displacement mortality was apportioned to the SPA on the basis of no connectivity in the breeding season (as the wind farm is located beyond the mean maximum foraging range of 48.5 km for this species) and an even distribution in the non-breeding season.

During the redetermination of the Application, the Applicant submitted updated PVA analysis for the Flamborough and Filey Coast SPA in accordance with the latest advice from NE. The updated displacement estimates were provided using a displacement percentage of 70% and a mortality rate of 2% would be 1.2 adults.

The Applicant and NE agreed that operational displacement from the Project alone would not result in an adverse effect on integrity on razorbill of Flamborough and Filey Coast SPA [REP7-075][REP9-046][REP9-057].

The ExA was content that an adverse effect on integrity on the razorbill feature of the Flamborough and Filey Coast SPA can be ruled out from the Project alone.

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

5.4.6 Razorbill Displacement: In-combination

The Applicant [REP8-069] calculated:

- The combined displacement mortality of razorbill across the whole year would be in the range 18 to 418 adults;
- This would increase the baseline mortality rate of the population (adults) by 0.8% to 19% (using NE's preferred displacement and mortality rates) or 1.3% (using the Applicant's preferred evidence based rates);
- The contribution to this from the Project was estimated to comprise 1.3%; and
- The maximum reduction in the population growth rate at a mortality of 400 would be 1.9% which would still permit population growth at over 5.3% per year.

The Applicant concluded that in-combination razorbill displacement would result in a slight reduction in the growth rate currently seen at this colony but would not be at a level which would trigger a risk of population decline, and so would not have an adverse effect on integrity of the SPA.

NE's own calculations [REP9-057] using alternative abundance figures, calculated an annual in-combination mortality of 17 to 403 excluding Hornsea Project Three and 18 to 422 including Hornsea Project Three. Based on the current population trend and productivity levels for the colony and a predicted decline in growth rate of less than 0.5% per annum, NE advised that an adverse effect on integrity on the razorbill feature of the Flamborough and Filey Coast SPA can be ruled out from displacement in-combination with other plans or projects if Hornsea Project Three is excluded from the in-combination total.

However, as with gannets of the Flamborough and Filey Coast SPA, NE stated it was not in a position to advise that an adverse effect on integrity can be ruled out for the razorbill feature of the Flamborough and Filey Coast SPA when Hornsea Project Three is included in the in-combination total, due to concerns over the Hornsea Project Three data [REP9-046][REP9-057].

The Hornsea Project Three supplementary aerial survey data collected between January and March 2019 showed population estimates of razorbill recorded in 2019 were higher in January and February compared with the same period in 2017, but marginally lower in March[50]. Displacement analysis indicated that the additional data increased the estimated mortality during the pre-breeding period from zero to one.

During the redetermination of the Project, as part of their final consultation response, NE provided an updated in-combination impact assessment[51]. The assessment was based on the updated in-combination

[50] Ørsted (2019). *Hornsea Project Three Offshore Wind Farm Ornithology Baseline Data Comparison* . 31 July 2019.

[51] Natural England (2021) *Natural England advice on Flamborough and Filey Coast (FFC) SPA PVAs and in-combination assessments*. 19th November 2021.

mortality figures presented by Norfolk Boreas[52] which excluded the contributions from Hornsea Project Four, Dudgeon Extension and Sheringham Shoal Extension.

NE confirmed that the in-combination displacement mortality total for the recommended rate of 30-70% displacement and 1-10% mortality is between 19 and 435 razorbills from the Flamborough and Filey Coast SPA per year for all projects, excluding Hornsea Project Four, Dudgeon Extension and Sheringham Shoal Extension. This predicted level of in-combination displacement impact equates to 0.44-10.24% of baseline mortality of the colony.

Using the most up to date PVAs which were undertaken by Norfolk Boreas, NE calculated that with an additional mortality total of 435 razorbills, the population of the Flamborough and Filey Coast SPA after 30 years would be 32.8% lower at 70% displacement and 10% mortality and the population growth rate would be reduced by 1.3%.

Whilst NE presented counterfactuals for mortality rates between 1% and 10%, they did not anticipate that the razorbill mortality rates would be at the top of this range and proposed that the mortality rate was unlikely to exceed a level where the population growth rate would decline by more than approximately 0.5% per year. It stated that based on this data, the current population trend for the colony and the restore conservation objective, NE's advice remained that an adverse effect on integrity on the razorbill feature of the Flamborough and Filey Coast SPA can be ruled out from displacement in combination with other plans or projects when all projects up to and including the Project, Hornsea Project Three, Norfolk Boreas, East Anglia One North and East Anglia Two are included in the in-combination totals.

Based on this advice, the Secretary of State concludes that an adverse effect on the integrity of the Flamborough and Filey Coast SPA from the effects of displacement from the Project in-combination with other plans and projects on razorbill can be excluded.

5.4.7 Guillemot Displacement: Alone

The Applicant considered that guillemot breeding numbers have shown strong growth over the last 20 years and are therefore in favourable conservation status [REP7-035]. It noted that the relevant conservation objective is to maintain favourable conservation status of the guillemot population, subject to natural change [REP8-069].

NE [REP9-057] acknowledged the Flamborough and Filey Coast SPA guillemot colony increased by 2.8% per annum between 1987-2008; that the designated population size is 83,214; and that the 2017 count indicated approximately 121,754 breeding adults. It confirmed that it did not expect the population growth rate to decline by more than approximately 0.4% per annum.

The Applicant's displacement assessment [REP8-069] used NE's preferred 70% displacement and 10% mortality rates and calculated worst-case displacement would be up to 10 adults (8 to 23.2 using 95% CIs). This would increase the background mortality by 0.3% (0.15% to 1.46% using the 95% CIs), and the maximum reduction in the population growth rate at a mortality of 50 would be 0.1% which would represent a negligible risk for the population.

It is noted that displacement mortality was apportioned to the SPA on the basis of no connectivity in the breeding season (as the wind farm is located beyond the mean maximum foraging range of 82.4 km for this species) and an even distribution in the non-breeding season.

[52] MacArthur Green (2021): Updated Population Viability Analysis Flamborough and Filey Coast SPA. V1. 20th August 2021.

During the redetermination of the Project, the Applicant submitted updated PVA analysis for the Flamborough and Filey Coast SPA in accordance with the latest advice from NE. The updated displacement estimates were provided using a displacement percentage of 70% and a mortality rate of 2% would be 2.9 adults.

The Applicant and NE agreed that operational displacement of guillemot from the Project alone would not have an adverse effect on integrity on Flamborough and Filey Coast SPA. [REP7-075, REP9-046 and REP9-057].

The ExA was content that an adverse effect on integrity on the guillemot feature of the Flamborough and Filey Coast SPA can be ruled out from the Project alone.

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

5.4.8 Guillemot Displacement: In-combination

The Applicant [REP8-069] calculated the combined displacement mortality of guillemot across the whole year would be in the range 71 to 1,649 individuals. This would increase the baseline mortality rate of the population (all ages) by 1.3% to 3.2% (using NE's preferred 70% displacement and 10% mortality rates) or 2.3% (using the Applicant's preferred evidence based 50% displacement and 1% mortality rates). The contribution to this from the Project was estimated to comprise 0.8% and the maximum reduction in the population growth rate at a mortality of 1,600 would be 1.9% which would represent a negligible risk for the population.

It is noted that displacement mortality was apportioned to the SPA on the basis of no connectivity in the breeding season (as the wind farm is located beyond the mean maximum foraging range of 105 km for this species) and an even distribution in the non-breeding season.

The Applicant concluded that in-combination guillemot displacement would result in a slight reduction in the growth rate currently seen at this colony but would not be at a level which would trigger a risk of population decline, and so would not have an adverse effect on integrity on the guillemot population of the Flamborough and Filey Coast SPA.

NE [REP9-057] calculated an annual in-combination mortality of 68 to 1,595 excluding Hornsea Project Three and 71 to 1,654 including Hornsea Project Three.

Based on the current population trend for the colony and the restore conservation objective, and on the basis of predicted displacement mortality for the Project in-combination with other plans or projects resulting in a decline in growth rate of no more than 0.4%, NE advised that an adverse effect on integrity on the guillemot feature of the Flamborough and Filey Coast SPA can be ruled out from displacement in-combination with other plans or projects if Hornsea Project Three is excluded from the in-combination total.

However, NE stated it was not in a position to advise that an adverse effect on integrity can be ruled out for the guillemot feature of the Flamborough and Filey Coast SPA when Hornsea Project Three is included in the in-combination total, due to concerns over the Hornsea Project Three data. [REP9-046 and REP9-057].

The ExA noted that NE's position regarding an adverse effect on integrity was due to concerns over the incomplete baseline surveys for Hornsea Project Three and the associated level of uncertainty of the potential impacts. On the basis of the uncertainty and information presented during Examination

regarding the impacts from Hornsea Project Three, the ExA was unable to exclude an adverse effect on integrity from the Project in combination with other plans or project beyond reasonable scientific doubt.

The Hornsea Project Three supplementary aerial survey data collected between January and March 2019 showed population estimates of guillemot recorded in 2019 were higher in January and February compared to the same period in 2017, but lower in March. The estimated mean seasonal peak populations remain unchanged and, consequently, with the inclusion of the additional data, the predicted level of mortality arising from displacement remained unchanged[53].

During the redetermination of the Project, as part of their final consultation response, NE provided an updated in-combination impact assessment[54]. The assessment was based on the updated in-combination mortality figures presented by Norfolk Boreas[55] which excluded the contributions from Hornsea Project Four, Dudgeon Extension and Sheringham Shoal Extension.

The Flamborough and Filey Coast SPA guillemot colony increased by 2.8% per year between 1987-2008. Furthermore, the 2017 colony count was approximately 121,754 breeding adults, compared to the designated population size is 83,214 breeding adults. The conservation objective for the guillemot population of the SPA is to maintain the size of the breeding population at a level which is above 41,607 breeding pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.

NE confirmed that the in-combination displacement mortality total for the recommended rates of 30-70% displacement and 1-10% mortality is between 75 and 1,748 guillemots from the Flamborough and Filey Coast SPA per year for all projects, excluding Hornsea Project Four, Dudgeon Extension and Sheringham Shoal Extension. This equates to 1.01-23.54% of the baseline mortality for the colony. After 30 years, these mortality rates would result in the population being 39.7% lower than it would be without the projects and the population growth rate would be reduced by 1.6%.

Whilst NE presented counterfactuals of mortality rates between 1% and 10%, they did not anticipate that the guillemot mortality rates would be at the top of this range and proposed that the mortality rate was unlikely to exceed a level where the population growth rate would decline by more than 0.5% per year. They suggest that under a reasonable scenario of 70% displacement and 2% mortality, there would be 350 additional mortalities per year and at these levels the PVA predicted a decline in the population growth rate of 0.3%, which is below the 0.5% threshold which would cause a population decline.

NE concluded that, based on the current population trend for the colony and the restore conservation objective, an adverse effect on the integrity of the SPA from the displacement of guillemots from the Project in-combination with other projects can be excluded.

Based on this advice, the Secretary of State concludes that an adverse effect on the integrity of the Flamborough and Filey Coast SPA from the effects of displacement from the Project in-combination with other plans and projects on guillemot can be excluded.

[53] Ørsted (2019). *Hornsea Project Three Offshore Wind Farm Ornithology Baseline Data Comparison*. 31 July 2019.

[54] Natural England (2021) *Natural England advice on Flamborough and Filey Coast (FFC) SPA PVAs and in-combination assessments*. 19th November 2021.

[55] MacArthur Green (2021): Updated Population Viability Analysis Flamborough and Filey Coast SPA. V1. 20th August 2021.

5.4.9 Seabird Assemblage Displacement: Alone

The seabird assemblage feature was screened in for LSE on the advice of NE and impacts on puffins were assessed in the context of the seabird assemblage [REP8-104].

Further to NE's comments on apportionment rates and CIs for puffin [REP7-075], the Applicant's initial displacement assessment [REP6-021] was revised [REP8-069]. It calculated that using NE's preferred 70% displacement and 10% mortality rates, there would be up to 0.02 additional mortalities which would increase the background mortality rate by 0.01%. The Applicant concluded that this would not result in an adverse effect on integrity.

Although NE calculated slightly different predicted impact figures [REP9-057], it confirmed that the predicted mortality is significantly closer to zero than a single bird, even at the upper 95% CIs. It therefore advised that an adverse effect on integrity of the puffin component of the Flamborough and Filey Coast SPA assemblage feature can be ruled out for predicted displacement impacts from the Project alone.

The ExA was content that an adverse effect on integrity on the puffin feature of the Flamborough and Filey Coast SPA can be ruled out from the Project alone.

Based on this advice, the Secretary of State concludes that an adverse effect on the integrity of the Flamborough and Filey Coast SPA from the effects of displacement from the Project alone on puffin can be excluded.

5.4.10 Seabird Assemblage Displacement: In-combination

The Applicant considered [REP7-035] that there is no requirement to undertake an in-combination assessment for puffin given the level of mortality attributable to the Project. It also noted that the Flamborough and Filey Coast SPA population is almost certainly significantly underestimated due to its inaccessibility and puffin nesting habits. Nevertheless, it provided an in-combination displacement assessment at Deadline 6 [REP6-021] which was subsequently revised [REP8-069] in response to NE's comments regarding apportioning of impacts [REP7-075].

The Applicant [REP8-069] calculated that the number of puffins apportioned to the Flamborough and Filey Coast SPA population at risk of displacement on North Sea wind farms to be 907 in the breeding season (none from the Project) and 95 in the non-breeding season (0.3 from the Project). Overall, of the 1,002 puffins (including Hornsea Project Three) at risk of displacement annually, 0.03% were birds from the Project.

The Applicant considered that the Project's contribution to any in-combination effect would make no difference and considered that the SPA population could be significantly underestimated due to difficulties to census puffin populations. The Applicant and NE agreed that an adverse effect on integrity could be excluded for in-combination displacement impacts on the puffin component of the seabird assemblage feature [REP9-057].

The ExA was content that an adverse effect on integrity on the puffin feature of the Flamborough and Filey Coast SPA can be ruled out from the Project in combination with other plans or projects.

Based on this advice, the Secretary of State concludes that an adverse effect on the integrity of the Flamborough and Filey Coast SPA from the effects of displacement from the Project in combination with other plans or projects on puffin can be excluded.

5.5 Appropriate Assessment: Greater Wash SPA

The Greater Wash SPA 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 at its furthest point. The site is located approximately 35 km from the Project at its closest point. The site covers an area of approximately 353,578 ha.

The Greater Wash qualifies as an SPA 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[56].

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 and common scoter from cable laying during construction and operation, and collision mortality of little gull during operation, both alone and in-combination with other plans or projects.

5.5.1 Red-throated diver Disturbance and Displacement: Alone

5.5.1.1 Disturbance and Displacement during construction of the cable route

The Secretary of State identified a potential likely significant effect on over-wintering red-throated diver from displacement during construction of the Project. This effect has the potential to occur along areas of the cable route that see an increase in vessel activity during construction.

The impact of displacement on divers can be quantified by applying a displacement rate and then a mortality rate to the relevant diver population. The evidence base from which these rates are derived is an evolving subject area and disagreements among the Interested Parties remain on which rate to use.

The Applicant's initial assessment [APP-045][REP1-010] assumed 80% displacement and 5% mortality of red-throated diver, however, NE advised a worst-case scenario of up to 100% displacement and up to 10% mortality out to 2 km from the cable route should be applied which could result in an adverse effect on integrity [REP1-088][REP3-051][REP4-062]. For this reason, NE [RR-106][REP1-088][REP7-075] advised that measures, such as avoiding cable laying activities during the nonbreeding season/period of peak diver numbers, should be considered to mitigate disturbance.

Although the Applicant presented a review of published evidence to justify the use of 90% displacement and 1% mortality within 2 km of the wind farm boundary [REP1-008], the RSPB [REP2-035] and NE [REP3-051] did not agree there was compelling evidence to warrant a change to NE's recommended rates. NE also clarified that its advice of a worst-case scenario of up to 100% displacement and up to 10% mortality out to 2 km related solely to the installation of the cable route and not to the wind farm boundary [REP8-104].

The Applicant subsequently provided an updated assessment using NE's preferred rates (100% displacement and 10% mortality from 2 vessels) [REP6-021]. This calculated between 4 to 8 additional mortalities during a single year from the Project alone this would increase baseline mortality by approximately 1.3% to 2.6%.

Although NE [REP7-075] agreed with the Applicant's calculations, it noted the cable route traverses an area of high red-throated diver density compared to elsewhere in the Greater Wash SPA and that

[56] http://publications.naturalengland.org.uk/publication/4597871528116224

displacement would mean the loss of habitat in an important area of the SPA for approximately 40 days during a winter/non breeding season. It did not agree to no adverse effect on integrity.

In response, whilst the Applicant explained that export cable installation is not planned to occur during the winter, it agreed that only one main cable laying vessel would be used should installation through the SPA be unavoidable during the most sensitive period for divers (January to March inclusive) [REP8-064]. This commitment is included in Condition 18 of the Transmission dMLs (Schedules 11 and 12 of the DCO) [REP8-003]. NE [REP7-075] confirmed that such restriction would allow a conclusion of no adverse effect on integrity for the Project alone.

It is noted that the Applicant also stated it would avoid construction in the SPA during these months if possible, however this avoidance was not secured, therefore NE placed no weight on this aspect of the Applicant's position [REP9-046]. The ExA agreed with this position in its recommendation.

5.5.1.2 Disturbance and Displacement during operation

NE advised that if mitigation measures such as those agreed for East Anglia Three could be agreed for fast moving boats, this would remove the likelihood of an adverse effect on integrity for red-throated divers [REP1-088][REP3-051][REP6-021].

In response the Applicant updated the dDCO to require "procedures to be adopted within vessels transit corridors to minimise disturbance to red-throated diver during operation and maintenance activities" (Condition 14(1)(d)(vi) of Schedules 9 and 10) [AS-038].

The outline Project Environmental Management Plan [REP7-022] was also revised to include the following mitigation measures to minimise disturbance to red-throated diver:

- Avoiding and minimising maintenance vessel traffic, where possible, during the most sensitive time period in January/February/March;
- Restricting vessel movements where possible to existing navigation routes (to areas where red-throated diver density is likely to be lowest);
- Maintaining direct transit routes (to minimise transit distances through areas used by red-throated diver);
- Avoidance of over-revving of engines (to minimise noise disturbance); and
- Avoiding rafting birds either in-route to array from operational port and/or within the array (dependent on location) and where possible avoid disturbance to areas with consistently high diver density.

Following the Applicant's agreement to adopt best practice vessel operation measures whilst traversing the SPAs, NE [REP9-046] agreed there would be no adverse effect on integrity from operational displacement to the red-throated diver population at the Greater Wash SPA from the Project alone.

Having considered the above assessment, the Secretary of State concludes that, with the restrictions on cable laying vessel use secured for construction, and with best practice mitigation also secured for the operational phase, that an adverse effect on the integrity of the Greater Wash SPA from the effects of disturbance and displacement from the Project alone on the red-throated diver feature can be excluded.

5.5.2 Red-throated diver Disturbance and Displacement: In combination

5.5.2.1 Disturbance and Displacement during construction of the cable route.

The Applicant's assessment determined that cable installation for the Project had the potential to occur at the same time as cable installation for Hornsea Project Two. Following the redetermination of the Project, Hornsea Project Two has since installed its offshore array cables and therefore no in combination

impact from cable installation could occur. According to the Applicant, other projects due to undertake installation or remedial works are highly unlikely to overlap. No information was received during the redetermination of the project which stated that this was no longer the case.

NE [RR-106, REP7-075 and REP8-104] also initially advised that consideration should be given to the in-combination disturbance/displacement effect on red-throated diver of cable laying with operational phase traffic from currently constructed or consented wind farms within the Greater Wash SPA. The Applicant argued that such an assessment would be inappropriate given the short duration of cable installation within the SPA (a maximum of six weeks would be required within the SPA), the limited area over which a cable laying vessel could exert an effect (even when a precautionary 2 km radius is applied) and the fact this would be a one-off event [REP8-064][REP9-038]. This was agreed with NE by the close of Examination [REP9-046] and only the effects of the Project in-combination with Hornsea Project Two were assessed.

When Hornsea Project Two and the Project were due to overlap, under the assumption of 100% displacement and 10% mortality at both project sites, 6 to 10 additional mortalities were expected in a single year. This was predicted to lead to an increase in baseline mortality between 2% and 3%.

However, in view of the restriction on vessel use committed to by the Applicant and secured in Condition 18 of the Transmission dMLs (Schedules 11 and 12 of the DCO), NE agreed with the Applicant that disturbance during cable laying operations would not lead to an adverse effect on site integrity. The ExA agreed with this position in its recommendation [ExA Report: 6.7.118].

5.5.2.2 Disturbance and Displacement during operation

Following the Applicant's agreement to adopt best practice vessel operation measures whilst traversing the SPAs, NE [REP9-046] agreed there would be no adverse effect on integrity from operational displacement to the red-throated diver population at the Greater Wash SPA from the Project in-combination with other plans or projects.

Having considered the above assessment, the Secretary of State concludes that, with the restrictions on cable laying vessel use secured for construction, and with best practice mitigation also secured for the operational phase, that an adverse effect on the integrity of the Greater Wash SPA from the effects of the Project in-combination with other plans or projects on the red-throated diver feature from disturbance and displacement can be excluded.

5.5.3 Common scoter Disturbance and Displacement: Alone and in-combination

The Secretary of State identified a potential likely significant effect on over-wintering common scoter from displacement during construction and operation of the Project. This effect has the potential to occur along areas of the cable route that see an increase in vessel activity during construction and also from vessels carrying out operational and maintenance activities.

The Applicant provided a figure showing Greater Wash SPA common scoter distribution and the offshore cable route, using the data presented in NE and JNCC (2016) [REP2-030]. The Applicant concluded that the offshore cable route does not overlap with any concentrations of common scoter [REP2-030].

NE [REP8-104] confirmed that the provision of the map allowed it to reach a conclusion of no adverse effect on integrity for the Project alone or in-combination.

On the basis of the above, the Secretary of State concludes that an adverse effect on the integrity of the Greater Wash SPA from the effects of disturbance and displacement from the Project alone and in-combination with other plans and projects on the common scoter feature can be excluded.

5.5.4 Little Gull Collision Mortality: Alone and in-combination

The Secretary of State identified a potential likely significant effect on over-wintering little gull due to the risk of collision if individuals enter the array.

Despite methodological disagreement, the Applicant provided CRM calculations in a format compatible with NE's preferred approach. These figures were provided at the request of the ExA.

Collisions from the Project alone are expected to result in 0.6 mortalities within the Greater Wash SPA cited population of 1,225 individuals, which represents an increase in background mortality of 0.24%. The Applicant considered this to be undetectable and NE agreed there would be no adverse effect on integrity in-combination. The ExA also agreed with this analysis in its recommendation.

By tabulating all available CRM outputs from other wind farms in-combination with the Project, the Applicant calculated that little gull mortalities would increase to 7.6 individuals within the Greater Wash SPA population. The Applicant considered this to be undetectable and NE agreed. The ExA also agreed with this analysis in its recommendation.

In view of the low mortalities predicted in this case, the Secretary of State concludes that adverse effects on the integrity of the Greater Wash SPA from the effects of collision mortality from the Project alone and in-combination with other plans or projects on the little gull feature can be excluded.

5.6 Appropriate Assessment: North Norfolk Coast SPA and Ramsar Site

The North Norfolk Coast SPA is a coastal site covering an area of approximately 7,887 ha. 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 80 km from the Project and 0.32 km from the onshore cable corridor.

The North Norfolk Coast qualifies as an SPA for 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 by supporting a wintering waterfowl assemblage of international importance[57].

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[58].

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 above listed features due to the potential for risk of collision mortality to migrating birds during operation, and displacement/disturbance and barrier effects on Montagu's harrier and

[57] http://publications.naturalengland.org.uk/publication/4732349359063040

[58] https://rsis.ramsar.org/ris/76

Ramsar site features during construction and operation, both alone and in-combination with other plans or projects.

5.6.1 All Migrating Features: Alone and in-combination

The ExA considered that some of the Applicant's screening conclusions lacked clarity. This included Montagu's harrier which was not included in the Applicant's integrity matrix [REP7-035] and was not assessed in the HRAR [APP-045]. It is, however, present in the conservation objectives for the site. Ramsar criterion 5 and 6 species were also not explicitly addressed in the HRAR [APP-045] or screening matrices [AS-044]. The ExA progressed these features to the integrity matrix in the RIES on a precautionary basis. The Applicant accepted this position [REP8-064].

The Applicant provided a document called Migrant Non-Seabird Collision Risk Modelling at Deadline 6 [REP6-022]. The species assessed were those that are considered to have the potential to cross the Project array area. The list of species were agreed to be appropriate by NE. For each species, collision risk modelling predicted that no more than one individual would collide each year. Such low numbers meant that background mortality would not go over the 1% threshold, which would ordinarily require the Applicant to undertake further population modelling. On this basis NE agreed that there would be no adverse effect on integrity. The ExA agreed with this conclusion.

At the request of NE the Applicant also considered the in combination mortality of the Project and East Anglia Three offshore wind farm. However, whilst a slight increase was predicted, the increase in background mortalities remained below the 1% threshold. On this basis NE agreed that there would be no adverse effect on integrity in-combination with other plans or projects. The ExA agreed with this conclusion. The Secretary of State is satisfied that the above assessment is appropriate. He agrees with the Applicant, NE and the ExA and concludes that that adverse effects on the integrity of the North Norfolk Coast SPA and Ramsar site from the effects of the Project alone and in-combination with other plans or projects on non-seabird migrants can be excluded.

5.7 Appropriate Assessment: Outer Thames SPA

The Outer Thames Estuary covers 379,200 ha, is located on the east coast of England and extends northward from the Thames Estuary to Great Yarmouth on the East Norfolk Coast. The SPA is situated approximately 21 km from the Project.

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. It also protects foraging areas for common tern and little tern during the breeding season. The conservation objective for red-throated diver is to maintain or enhance favourable condition of the population[59]. The SPA is situated in a busy marine area subject to large-scale permanent infrastructure, busy shipping lanes, and other vessel movement.

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 potential

[59] https://jncc.gov.uk/our-work/outer-thames-estuary-spa/

for a likely significant effect on red throated diver due to disturbance and displacement from vessel movements alone and in-combination with other plans or projects during the operational phase.

5.7.1 Red-throated diver Disturbance and Displacement: Alone and in combination

In view of a potential 1% increase to the baseline of vessel movements in the area during the operational phase, NE advised that mitigation measures such as those agreed for East Anglia Three regarding vessel movement should be adhered to [REP1-088][REP3-051][REP6-021].

In response the DCO requires "*procedures to be adopted within vessels transit corridors to minimise disturbance to red-throated diver during operation and maintenance activities*" (Condition 14(1)(d)(vi) of Schedules 9 and 10).

The outline Project Environmental Management Plan [REP7-022] was also revised to include the following mitigation measures to minimise disturbance to red-throated diver:

- Avoiding and minimising maintenance vessel traffic, where possible, during the most sensitive time period in January/February/March;
- Restricting vessel movements where possible to existing navigation routes (to areas where red-throated diver density is likely to be lowest);
- Maintaining direct transit routes (to minimise transit distances) through areas used by red-throated diver);
- Avoidance of over-revving of engines (to minimise noise disturbance); and
- Avoiding rafting birds either in-route to array from operational port and/or within the array (dependent on location) and where possible avoid disturbance to areas with consistently high diver density.

Following the Applicant's agreement to adopt best practice vessel operation measures whilst traversing the SPAs, NE [REP9-046] agreed there would be no adverse effect on integrity from operational displacement to the red-throated diver population at the Outer Thames SPA from the Project alone and in combination with other plans or projects. The ExA was content that an adverse effect on integrity on the red-throated diver feature of the Outer Thames Estuary SPA from disturbance and displacement can be ruled out from the Project alone and in combination with other plans or projects.

Having considered the above assessment, the Secretary of State agrees that, with best practice mitigation secured for the operational phase, he is able to conclude that adverse effects on the integrity of the Outer Thames Estuary SPA from the effects of disturbance and displacement from the Project alone and in-combination with other plans or projects on red-throated diver can be excluded.

5.8 Appropriate Assessment: The Broads SAC

The Broads SAC in East Anglia covers an area of approximately 5,865.6 ha and is located approximately 3.6 km south of the onshore project area. The site contains several examples of naturally nutrient-rich lakes, one of the richest assemblages of rare of local aquatic species in the UK, as well as the largest example of calcareous fens in the UK[60].

The Broads SAC supports the following qualifying features:

[60] http://publications.naturalengland.org.uk/publication/6190476679970816

- Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. (Calcium-rich nutrient-poor lakes, lochs and pools);
- Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation (Naturally nutrient-rich lakes or lochs which are often dominated by pondweed);
- *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) (Purple moor-grass meadows);
- Transition mires and quaking bogs (Very wet mires often identified by an unstable `quaking` surface);
- Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* (Calcium-rich fen dominated by great fen sedge (saw sedge))*;
- Alkaline fens (Calcium-rich springwater-fed fens);
- Alluvial forests with *Alnus glutinosa* and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*) (Alder woodland on floodplains)*;
- Desmoulin`s whorl snail;
- Otter;
- Fen orchid; and
- Little whirlpool ram's-horn snail.

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 above listed features due to due to the potential for indirect effects upon habitats and species within the SAC boundary arising from changes in local groundwater / hydrology conditions and direct effects on land within the SAC boundary during construction, alone and in-combination with other plans or projects.

5.8.1 Changes to groundwater flow: Alone and in-combination

The Applicant's assessment [APP-045][REP7-035] explains that the Broad Fen, Dilham SSSI is one of the 28 component SSSIs of The Broads SAC. The onshore cable route would cross the North Walsham and Dilham Canal approximately 9.9 km upstream of The Broads SAC using trenchless crossing techniques. The Applicant concludes that as no work will take place within the watercourse, no potential effects are anticipated [APP-045].

However, NE [RR-106] were concerned that no information was provided on the water supply mechanism for The Broads SAC. It advised that further information be obtained from the EA (e.g. WetMec data showing water supply mechanisms for all the component sites and/or EA's groundwater modelling) to undertake a detailed appraisal of groundwater effects on the SAC.

The Applicant's first clarification note regarding groundwater dependent designated sites [REP1-049] confirmed that The Broads SAC is predominantly surface water fed, but also partly groundwater fed from the underlying chalk aquifer. It concluded that there is no direct pathway between construction works and the underlying chalk aquifer, therefore a detailed groundwater assessment was not considered necessary [REP1-007]. However, NE [REP1-088][REP2-036]) noted WetMec data had not been provided and considered that there remained insufficient information to provide a substantive response.

The Applicant's revised clarification note [REP6-013] included a conceptual model of groundwater flows using WetMec data to provide further clarity regarding groundwater flows. The note explained that the onshore cable trenching and trenchless crossing activities associated with the onshore project construction phase would remain at least 7 m above the chalk aquifer at any point and would be separated from the chalk aquifer by the boulder clay aquiclude. As such, the Applicant concluded there is no pathway between the onshore project area and any of the designated sites. The Applicant did not

consider that an in-combination assessment with Hornsea Project Three was required [REP1-007][REP4-040].

NE [REP9-046] subsequently confirmed that it was satisfied with the information supplied and that the design of all watercourse crossings, diversions and reinstatement would be submitted to and approved by the relevant planning authority in consultation with NE, prior to the commencement of each stage of the onshore transmission works (as secured through Requirement 25 of the DCO [REP9-007]). It agreed that there would be no adverse effect on integrity on The Broads SAC either alone or in-combination with Hornsea Project Three. The ExA was content that an adverse effect on integrity on The Broads SAC from changes to groundwater flow could be ruled out from the Project alone and in combination with other plans or projects.

The Secretary of State is satisfied that all necessary mitigation has been adequately secured and concludes that an adverse effect on the integrity of The Broads SAC, from the effects of the Project alone and in-combination with other plans or projects on changes to groundwater flow upon habitats and species within the SAC boundary, can be excluded.

5.8.2 Sedimentation: Alone and in-combination

NE raised concerns about the level of detail within the Code of Construction Practice ("CoCP") regarding measures to safeguard The Broads SAC in relation to sediment control and reinstatement of all work areas [RR-106][REP1-088]. The Applicant responded with a note [REP6-013] to clarify its approach to onshore construction works within functional floodplains and identify mitigation measures to minimise the risk of sediment or pollutant release. It clarified its approach to grassland reinstatement and captured these commitments in the outline CoCP [REP7-006].

NE [REP7-075][REP9-046] subsequently confirmed it had withdrawn its concerns. It agreed that the site-specific management plans required for each watercourse crossing (Requirement 25 of the DCO) would include site specific details regarding sediment management and pollution prevention measures and would lead to no adverse effect on integrity on The Broads SAC. The ExA was content that the Applicant had demonstrated that its measures to control sediment and for reinstatement/restoration would not result in an adverse effect on integrity on the Broads SAC from the Project alone and in combination with other plans or projects. The ExA was satisfied that Requirement 25 of the DCO provides adequate means to secure ant necessary mitigation.

Based on the above, the Secretary of State has concluded that an adverse effect on integrity from sedimentation on The Broads SAC as a result of the Project alone and in-combination with other plans or projects can be excluded.

The Secretary of State is satisfied that all necessary mitigation has been adequately secured and concludes that an adverse effect on the integrity of The Broads SAC, from the direct effects of the Project alone and in-combination with other plans or projects on site features can be excluded.

5.9 Appropriate Assessment: Haisborough, Hammond and Winterton SAC

The Haisborough, Hammond and Winterton SAC is a marine site in the Southern North Sea. The site covers an area of 146,759 ha and is located to the west of NV West, and the offshore cable corridor passes through the SAC. The Annex 1 features which are the primary reason for the selection of the SAC are sandbanks which are slightly covered by sea water all the time and biogenic reefs.

The site contains a series of sandbanks which run parallel to the coast. The fauna of the sandbank crests is predominantly low-diversity polychaete and amphipod communities that are typical of mobile sediment

environments. The banks are separated by troughs containing more gravelly sediments supporting diverse infaunal and epifaunal communities with ross worm *S.spinulosa* reefs. Aggregations of *S. spinulosa* provide additional hard substrate for the development of rich epifaunal communities.

The Project's offshore cable corridor overlaps with the Haisborough, Hammond and Winterton SAC and therefore there is potential for the designated features of the SAC to be impacted during construction and maintenance.

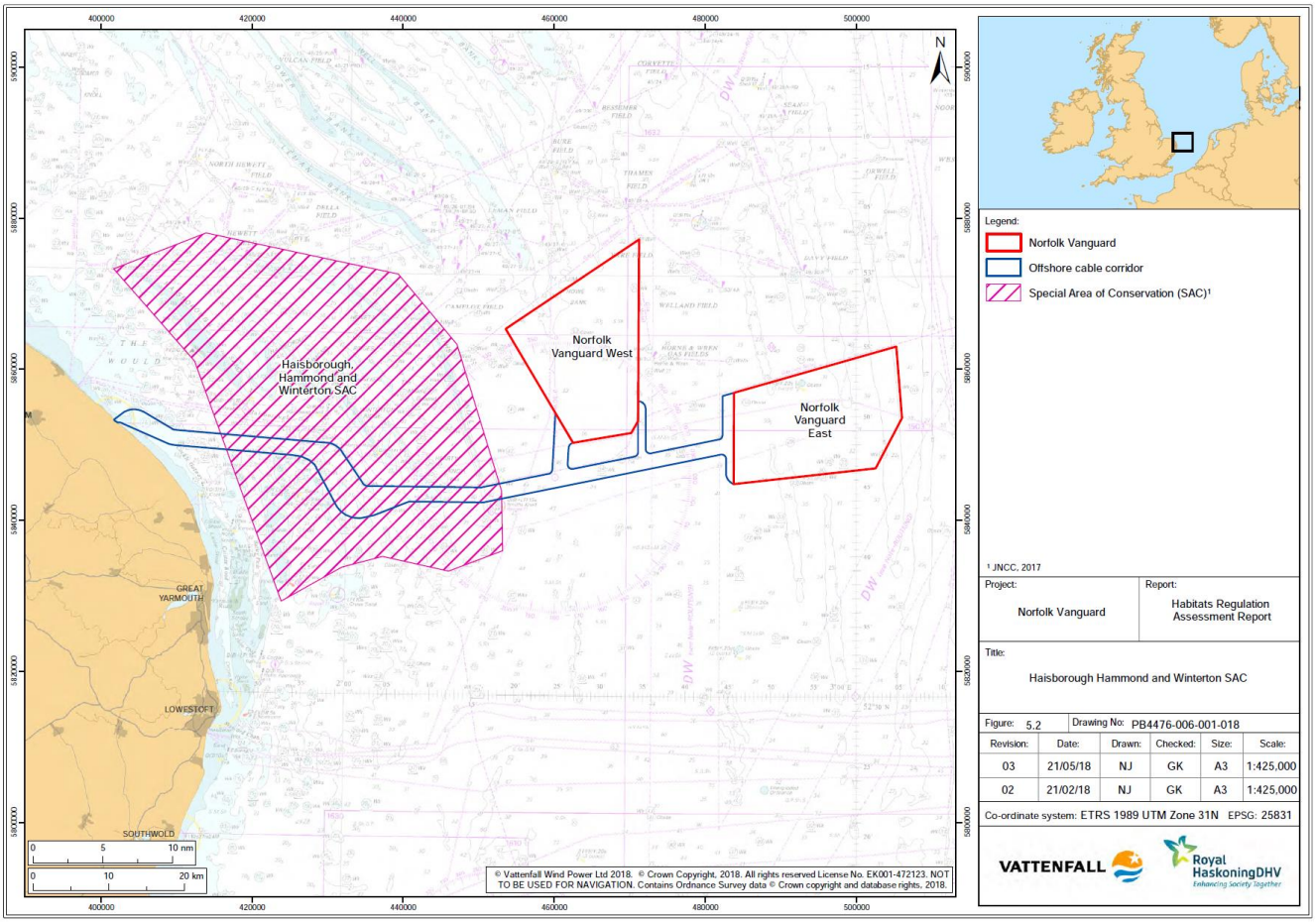

Figure 3: The Project's offshore cable corridor and the Haisborough, Hammond and Winterton SAC.

During Examination, NE advised that, due to a recent condition assessment of the features within the Haisborough, Hammond and Winterton SAC, NE's view is that the Annex I Reef and Sandbank features are in unfavourable condition and need to be restored to favourable condition [REP1-088].

NE recently undertook a condition assessment of the features within Haisborough Hammond and Winterton SAC (provided to the Norfolk Vanguard Examination) and their latest view (unpublished) is:

The "*condition of the sandbank feature is in unfavourable condition and needs to be restored to favourable condition. Restoration of the feature requires an overall reduction, or removal, of pressures associated with human activities that cause impacts to the sandbanks' extent and distribution, delineated by both substratum and biological communities. As such, any human activities which can cause pressures*

resulting in changes to substratum or biological communities to the sandbank feature may present a risk to the site's restoration"[61].

The conservation status of both Annex I features are currently unfavourable and the conservation objective for this site is to maintain and restore these features to favourable condition by restoring their extent, distribution, structure, function and any supporting processes upon which they rely.

The favourable condition of Annex I sandbanks which are slightly covered by seawater all the time and Annex I reefs requires the long-term maintenance of:

- the extent of the habitat (and elevation and patchiness for reef);
- the diversity of the habitat;
- the community structure of the habitat (population structure of individual species and their contribution to the functioning of the habitat); and
- the natural environmental quality (e.g., water quality and suspended sediment levels).

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 potential impacts identified at this site were through temporary physical disturbance, permanent habitat loss, the introduction of new substrates, and sediment smothering of the sandbank and reef features. The effects of these impacts were assessed for the Project alone and in combination with other plans and projects.

The Project intends to share some installation works with the Norfolk Boreas offshore wind farm including the parts of the offshore cable route which overlap with the Haisborough, Hammond and Winterton SAC. The in-combination effects between the two projects were assessed as part of the Norfolk Boreas HRA[62] and are also provided in Section 5.9.2 and Section 5.9.4.

The assessment takes the following avoidance and mitigation measures into account [APP-045]:

- The use of high voltage direct current (HVDC) to reduce the number of cables and therefore reduce trenching and associated operations, as well as the space required for cable installation;
- A pre-construction survey in advance of cable installation to plan the routeing of the cables;
- Micro-siting of the cables where possible to avoid features such as reef or unexploded ordnance (UXO) identified in the pre-construction survey: the cable route would be agreed with the relevant SNCBs;
- A commitment to bury offshore export cables, where possible, to reduce the need for surface cable protection; cable protection would be limited to 10% of the cable length within the SAC;
- Use of sandwave levelling as a dredging operation to reduce the risk of cables becoming unburied and requiring cable protection installed during the operational phase;
- All seabed material arising from cable installation within the SAC would be placed back in the SAC to ensure that the sediment is available to replenish the sandbank features: sediment would not be disposed of within 50m of the reef feature in accordance with advice from NE; and
- Production of a Site Integrity Plan (SIP) for the SAC to provide a framework to develop and agree the mitigation and monitoring measures required. Activities under the relevant DMLs would not begin until the Marine Management Organisation, in consultation with the relevant SNCB, was content that the SIP would provide adequate mitigation [REP9-028].

[61] Royal Haskoning (2019): *Norfolk Vanguard Offshore Wind Farm: Applicant's Comments on Written Representations: Appendix 1 Comments on Annex C of Natural England's Deadline 1 Submission. Document Reference:* ExA; WQRApp1; 10.D2.3.

[62] https://infrastructure.planninginspectorate.gov.uk/projects/eastern/norfolk-boreas/?ipcsection=docs

Delivery of the SIP would have been secured through a Grampian condition in the DMLs, preventing construction beginning until the Marine Management Organisation was satisfied, in consultation with Natural England that the SIP provided such mitigation as was necessary [REP8-104][REP9-038]. Avoidance and mitigation measures previously committed to be delivered via the Haisborough, Hammond and Winterton SAC SIP, must now be reflected in the Benthic Implementation and Monitoring Plan ("BIMP") which supersedes the SIP.

5.9.1 Annex I Sandbanks which are Slightly Covered by Sea Water all the Time: Alone

As the offshore cable corridor overlaps with the SAC, impacts on this feature could arise from: the levelling of sandwaves during cable installation; cable repairs during operation; and permanent habitat loss from cable protection.

5.9.1.1 Sandbank Levelling, Cable Installation, and Repairs

The Applicant predicted that the area to be impacted will be approximately 2.4 km^2 during construction, which equates to approximately 0.17% of the SAC [REP9-029]. The Applicant's original assessment [APP-045] concluded that the cable route would not have an adverse effect on the Haisborough, Hammond and Winterton SAC.

The ExA's report summarises the Applicant's assessment in relation to sandbanks as follows:

- The overall form and function of any particular sandwave, or the SAC sandbank system as a whole, would not be disrupted;
- The cable corridor is in an active and highly dynamic environment which is conducive for the development and maintenance of sandbanks;
- Sediment would remain within the boundaries of the SAC so there would be no significant change to sandbank extent, topography and sediment composition; and
- Once re-deposited on the seabed, the sediment would immediately re-join the local and regional sediment transport system and would not affect the form or function of the sandbanks or the sandbank communities which are adapted to natural disturbance and are therefore likely to be able to recover within a few tidal cycles.

NE advised that the Applicant should commit to depositing any dredged material in locations within the SAC that contained benthic material of similar particle size. The Secretary of State consulted on this request. The Applicant has not been able to commit to ensuring that the particle size composition is within 95% of the similarity to the particle size composition of the seabed at the disposal location. This is on the basis that it is not feasible to extensively sample all sediments to enable a realistic analysis of 95% similarity. The Applicant committed to requiring the location and method for sediment disposal being agreed with the MMO in consultation with NE. This was secured in the Haisborough, Hammond and Winterton SAC Site Integrity Plan ("SIP").

NE highlighted that it's condition assessment of the SAC concluded that the sandbank feature is in unfavourable condition and needs to be restored. It acknowledged that the mobile nature of the sandbank system means it would be more likely to recover from changes in structure than less mobile systems [RR-106][REP1-049]. However, it considered there to be limited survey data within the SAC and considered there to be a lack of evidence for timescales of recovery of sandwaves from sandwave clearance or evidence that the system would be undisturbed. It expressed concerns in relation to the overall impacts to the form and function of the Annex I Sandbank and sandwave fields and their potential recoverability. The MMO also did not agree that the SAC would remain undisturbed from sandwave levelling [RR-186][REP1-044].

By the end of Examination, the SoCG between the Applicant and NE identified NE's concerns in relation to the overall form and function of the sandbank fields and their potential recoverability. NE agreed that the physical processes associated with the sandbanks in the Haisborough, Hammond and Winterton SAC have the potential to recover from construction activities within the range of natural variation [REP5-007][REP9-046].

Subsequent to the High Court judgement which quashed the Secretary of State's original decision to grant development consent for the Project, NE[63] requested that the further information requirements set out in the Norfolk Boreas consultation be addressed in the redetermination of the Project. Concerns regarding the potential impacts on the form and function of the sandwave fields and their potential to recover were raised during the Norfolk Boreas Examination by NE.

To address concerns on the benthic impacts of the Project on the SAC, during the redetermination of the Project, in addition to the evidence outlined in the ABPmer Sandwave Study [APP-048], the Secretary of State requested the Applicant provide details of any new evidence for the recovery of sandbanks after levelling and cable installation[64].

Larsen et., al (2019) [65] analysed data from 19 different surveys at the Race Bank offshore wind farm to assess the recovery of sandwaves from pre-sweeping undertaken as part of the cable installation. The analysis showed full recovery had occurred or was progressing within one year of the impact occurring. The results of this study are relevant to this assessment because Race Bank offshore wind farm is located in the Race Bank-North Ridge-Dudgeon Shoal sandbank system which exhibits very similar environmental conditions to that experienced within the SAC: furthermore, the approach to seabed preparation for cable installation at these sites would be similar.

The Crown Estate (2019) [66] report reviewed monitoring data from numerous offshore wind farms in UK waters and collated information on how the seabed has recovered from different impacts under different marine conditions. The report demonstrates that areas with sandy seabed types usually recover rapidly and in full following seabed levelling and trenching. The report concludes that sandy sediments recover well following cable installation as evidenced by a lack of cable trenches observed at a number of offshore wind farms including Barrow, Burbo Bank, and sand areas of Sheringham Shoal and Robin Rigg. The section of the Project offshore cable corridor which crosses the SAC is dominated by sandy sediments, and therefore, the sandbank feature of the SAC would be expected to recover in a similar timeframe as those at Barrow, Burbo Bank, Sheringham Shoal and Robbin Rig offshore windfarm.

The Applicant highlighted that the Haisborough, Hammond and Winterton SAC sandbank system is very mobile with high levels of sediment transport, as acknowledged by NE in its RR [RR-106]. The section of the cable corridor which crosses the Haisborough, Hammond and Winterton SAC is dominated by sandy sediments. As such, the Applicant stated that the findings of the TCE review therefore support the claims

[63] Natural England (2021). *Request for Information following the High Court's Decision to Quash the Norfolk Vanguard Offshore Wind Farm Order 2020.* 30th April 2021.

[64] BEIS (2021). *Application by Norfolk Vanguard Limited ("the Applicant") for an Order granting Development Consent for the proposed Norfolk Vanguard Offshore Wind Farm and associated offshore and onshore infrastructure ("the Norfolk Vanguard project").* 11 August 2021.

[65] Larsen, S. M., Roulund, A. and McIntyre, D. L. (2019). *Regeneration of Partially Dredged Sandwaves*. Coastal Sediments 2019, pp. 3026-3039.

[66] RPS. (2019). *Review of Cable Installation, Protection Mitigation and Habitat Recoverability*. Commissioned by the Crown Estate.

made during Examination [APP-045], that the sandbanks and sandwaves within the Haisborough, Hammond and Winterton SAC are likely to fully and rapidly recover.

NE advised that their position remains that an adverse effect on integrity cannot be ruled out beyond reasonable scientific doubt from sandwave sweeping and that sandbank recovery should be monitored and secured in the In Principle Monitoring Plan[67].

The Secretary of State concludes that the information above represents the best scientific evidence available on the potential for Annex I Sandbank features to recover. Based on this evidence, the Secretary of State concludes that the impacts of sandbank levelling cable installation and repairs from the Project alone would be a short-term and temporary and would not have an adverse effect upon the conservation objectives of the Haisborough, Hammond and Winterton SAC.

5.9.1.2 Cable Protection

Cable protection is used in areas where the offshore export cable cannot be buried (due to unsuitable benthic conditions) and where the export cable crosses other cables and pipelines.

During Examination, NE considered that addition of hard substrate would be incompatible with conservation objectives for Annex I Sandbanks and advised repeatedly that they should not be used within the SAC [RR-106][REP1-088][REP2-004][REP4-062][REP6-032]. It advised that cable protection has the potential to cause long-term impacts and/or permanent changes to site features.

To address NE's concerns the Applicant refined the length of cable protection required within the SAC, excluding cable crossings, to 5% from 10% [REP6-004]. This change was committed to in the Outline SIP.

In relation to operational impacts, the Applicant's HRAR concluded that due to the short term, temporary nature and small scale of any maintenance works, there would be no effect on the form or function of the sandbank system or communities and therefore no adverse effect on integrity. NE noted the lack of discussion around the need for future reburial or cable protection and that it had not seen evidence that sandwave levelling ensures that cables remain buried [RR-106][REP1-088][REP2-036]. The Applicant explained that the SIP aims for cables in the SAC to be buried below the mobile sandwaves to avoid or minimise reburial during operation. The requirement for reburial during operation would depend on the installation strategy. NE agreed a conclusion of no adverse effect on integrity to sandbanks from physical disturbance during operation, however this was dependent on no cable protection being used at the ends of the cable repair sections which may be sub-optimally buried. The Applicant confirmed that in accordance with the Offshore Operations and Maintenance Plan [REP9-038], any new areas of cable protection required during maintenance would be subject to additional licensing.

Notwithstanding the reductions made to cable protection length, the Applicant acknowledged the uncertainty relating to the Haisborough, Hammond and Winterton SAC. To address this, the Applicant proposed to secure mitigation with a commitment to produce a Haisborough, Hammond and Winterton SAC SIP prior to construction. This change had been secured through Conditions 9(1)(l) and 9(1)(m) of the Transmission dMLs (Schedules 11 and 12 of the DCO) in the DCO which was subsequently quashed following the High Court judgement. The SIP would have set out the process for agreeing with the MMO and NE all works and mitigation measures associated with offshore cable installation and maintenance within the Haisborough, Hammond and Winterton SAC to ensure there would be no adverse effect on

[67] Natural England (2021). *Norfolk Vanguard – Consultation on Applicant's response to the Secretary of State's Additional Information Request*. 19 November 2021.

integrity on the site. This was repeated within the Applicant's response to the Secretary of State's consultation where the Applicant committed to agree the cable route with the MMO in consultation with NE and agree the location, extent, type and quantity of any cable protection with the MMO in consultation with NE prior to deployment[68].

At the close of Examination, the SoCG between the Applicant and NE [REP9-046] identified NE's residual concerns in relation to the overall impacts to the form and function of the Annex I sandbank fields and their potential recoverability. However, NE agreed [REP9-046] that the commitment to complete a SIP, allowed a conclusion of no adverse effect on integrity to be made at the consent stage on the basis that it restricts the commencement of construction until such time that mitigation measures can be adopted to contain the effects of the development to those already assessed and to rule out an adverse effect on integrity.

In addition to the above commitments, the Secretary of State has also noted that the Applicant has drawn up a decommissioning plan that provides evidence on the removal of all cable protection at the time of decommissioning[69]. The Secretary of State considered it necessary to secure the decommissioning of cable protection within the original DCO (Condition 23 in Schedules 9 and 10, and Condition 19 in Schedules 11 and 12.)

During the Norfolk Boreas Examination, the Norfolk Boreas Applicant, Natural England and the Marine Management Organisation agreed revised text to provide confidence that cable protection could be decommissioned, to be included as a Requirement in the dDCO, and not in the DMLs. This text has been replicated for this Project and is secured at DCO Requirement 14 of Schedule 1, Part 2:

(1) No offshore works may commence until a written decommissioning programme in compliance with any notice served upon the undertaker by the Secretary of State pursuant to section 105(2) of the 2004 Act has been submitted to the Secretary of State for approval.

(2) The obligations under paragraphs (3) and (4) shall only apply in respect of cable protection, apart from at cable crossing locations with existing cables and pipelines, which is installed as part of the authorised project within the Haisborough, Hammond and Winterton Special Area of Conservation as at the date of the grant of the Order.

(3) No later than 4 months prior to each deployment of cable protection in the Haisborough, Hammond and Winterton Special Area of Conservation, except where otherwise stated or unless otherwise agreed in writing by the Secretary of State, the undertaker must submit the following documents for approval by the Secretary of State:

(a) A decommissioning feasibility study on the proposed cable protection to be updated at intervals of not more than every ten years throughout the operational phase of the Project.

(b) A method statement for recovery of cable protection;

(c) A Monitoring Plan including appropriate surveys of cables situated within the Haisborough, Hammond and Winterton Special Area of Conservation that are subject to cable protection to assess the integrity and condition of that cable protection and determine the appropriate extent of the

[68] Vattenfall (2020a). *Norfolk Vanguard Offshore Wind Farm Additional Mitigation Department for Business, Energy and Industrial Strategy (BEIS) Request for information*. Doc. Ref: ExA; Mit; 11.D10.2. 28 February 2020.

[69] Vattenfall (2020b). *Norfolk Vanguard Offshore Wind Farm applicant's response to request for information Department for Business, Energy and Industrial Strategy (BEIS) Request for information.* Document Reference ExA; WQ; 11.D10.1. 28 February 2020.

feasibility of the removal of such cable protection having regard to the condition of the cable protection and feasibility of any new removal techniques at that time, along with a method statement for recovery of cable protection;

(d) A monitoring plan to include appropriate surveys following decommissioning to monitor the recovery of the area of the Haisborough, Hammond and Winterton Special Area of Conservation impacted by cable protection.

(4) No cable protection can be deployed in the Haisborough, Hammond and Winterton Special Area of Conservation until the Secretary of State, in consultation with the MMO and the Statutory Nature Conservation Body approves in writing the documents pursuant to (3) above.

NE welcomed the potential to decommission but advised that it cannot be certain that the habitat will recover to its pre-impacted state after such a temporally long time[70]. In total, the Applicant estimated that the maximum total footprint of cable protection in the SAC from the Project alone could be 2.4 ha[71].

Subsequent to the High Court judgement which quashed the Secretary of State's decision to grant development consent for the Project, NE[72] requested that the further information requirements set out in the Norfolk Boreas consultation be addressed in the redetermination of the Project. Concerns regarding the adverse effects of habitat loss associated with cable protection were raised during the Norfolk Boreas Examination by NE.

The Secretary of State has considered the information presented above and considers that habitats which are subjected to cable protection, will experience the effects of habitat loss and habitat modification. As the cable protection will be in place for 30 years, this is considered a long-term effect, and at crossing points it will be permanent. Furthermore, cable protection measures are likely to impede the restoration of the Annex I habitats for the duration that they are in place. These habitats are currently in an unfavourable condition, and delays to their restoration would be contrary to the conservation objectives of the SAC. The Secretary of State concludes that an adverse effect on integrity on the sandbank feature of the Haisborough Hammond and Winterton SAC from cable protection from the Project alone cannot be excluded.

5.9.1.3 Increased Suspended Sediments

The impacts of increased suspended sediments on the sandbank feature from the Project alone were screened in for potential likely significant effect [AS-045]. The Applicant's assessment stated that this would not have a physical impact on sandbanks as the resuspended material would be the same as that currently present and the communities associated with the sandbank are habituated to this sediment type [APP-045]. As such, the effect of increased suspended sediment on sandbanks was not included in the Applicant's integrity matrices [REP7-035] or included in the integrity matrices in Annex 3 of the RIES [PD-016].

[70] Natural England (2020). *Norfolk Vanguard Offshore Wind Farm post examination consultation. Planning Inspectorate Reference: EN010079.* 27th April 2020.

[71] Royal HaskoningDHV (2021). *In Principle Habitats Regulations Derogation Provision of Evidence – Appendix 3 Haisborough, Hammond and Winterton SAC In Principle Compensation (Version 2).* Doc. Ref: 8.25 ExA; IROPI; 11.D11.3.App1. August 2021.

[72] Natural England (2021). *Request for Information following the High Court's Decision to Quash the Norfolk Vanguard Offshore Wind Farm Order 2020.* 30th April 2021.

In their comments on the RIES NE did not provide specific comment on this impact pathway [REP8-104] nor state objection to its omission in their final SoCG with the Applicant [REP9-046].

The Secretary of State concludes that adverse effects on the integrity of the Haisborough Hammond and Winterton SAC from increased suspended sediment from the Project alone can be excluded.

5.9.2 Annex I Sandbanks which are Slightly Covered by Sea Water all of the Time: In combination

5.9.2.1 Sandbank Levelling, Cable Installation, and Repairs

The Applicant's in-combination assessment was restricted to Norfolk Boreas as no other plans or projects are considered to have the potential to affect the Haisborough, Hammond and Winterton SAC. The Applicant's assessment [APP-045] notes that installation of the Norfolk Boreas export cables would likely follow that of the Project with no temporal overlap. The spatial footprint of installation works for both the Project and Norfolk Boreas together is likely to be double that of the Project alone as a worst-case scenario; although some elements of the seabed preparation may overlap and would therefore reduce the overall combined footprint.

The Applicant concluded that there would not be enough time for sandwaves levelled for the Project to migrate into the area to be levelled for the Norfolk Boreas project. Therefore, there should be no additional impact on the sandbanks due to the in-combination effect of both projects.

The Applicant concluded there would be no adverse effect on integrity from the Project and Norfolk Boreas in combination [APP-045][REP8-064].

Although NE acknowledged that impacts would be temporary and spatially separate, it was concerned about the implications of the site being in unfavourable condition for more than 10 years and that impacts occurring to the same sandbank from may hinder recoverability of the feature over a longer period [REP1-088][REP2-036][REP8-104].

At the close of Examination, the SoCG between NE and the Applicant [REP9-046] agreed that in-combination impacts with Norfolk Boreas must be considered when developing the Haisborough, Hammond and Winterton SAC SIP. The Outline SIP [REP9-028] required consideration be given to Norfolk Boreas to ensure mitigation solutions were compatible for both projects.

The Secretary of State notes that the total period over which effects could occur would be up to four years. The spatial footprint of installation works for both the Project and Norfolk Boreas is likely to be double that of the Project alone, as a worst-case scenario. Based on this scenario, the total area impacted by temporary habitat loss/ disturbance within the Haisborough Hammond and Winterton SAC during the construction phase is 4.8 km^2.

The cumulative impacts are predicted to affect around 0.3% of the SAC for up to four years, with the potential for further intermittent disturbance from repair works in discrete areas throughout the duration of the Project.

The Applicant submitted additional information during the redetermination of the Project[73] [74] in addition to the evidence outlined in the ABPmer Sandwave Study [APP-048]. The reports from Larsen et al.,

[73] Royal HaskoningDHV (2021) *Norfolk Vanguard Offshore Wind Farm – The Applicant's Response to the Request for Further Information*. 25th August 2021.

[74] Royal HaskoningDHV (2021) *Norfolk Vanguard Offshore Wind Farm – The Applicant's Response to the Request for Additional Information. Appendix 3 Review of Cable, Installation, Protection Mitigation and Habitat recoverability.* 25th August 2021.

(2019) [75] and The Crown Estate (2019) [76] (described in further detail in Section 5.9.1.1) indicated that the sandbanks are likely to recover quickly from levelling, cable installation, and repair following studies of sandbank recovery from offshore wind farms located in sandbank systems which are comparable in their environmental conditions to the Haisborough, Hammond and Winterton SAC.

Based on the current information available regarding sandbank recovery, the Secretary of State is satisfied that an adverse effect on integrity on the Haisborough, Hammond and Winterton SAC from the effects of sandbank levelling, cable installation and repairs from the Project in-combination with Norfolk Boreas offshore wind farm on Annex I Sandbanks can be excluded.

5.9.2.2 Cable Protection

The Applicant concluded there would be no adverse effect on integrity from the Project and Norfolk Boreas in combination [APP-045][REP8-064].

The spatial footprint for the area affected by cable protection from the two projects is expected to be twice the area that would be affected from the Project alone, as the worst case scenario.

The Haisborough, Hammond and Winterton SAC In Principle Compensation Plan[77] states that the in-combination impact of habitat loss from cable protection is 4 ha. However, this figure is provided without the inclusion of cable protection that is required for cable crossings, the figure for this is stated in the report as 0.4 ha for the Project and 0.4 ha for Norfolk Boreas. Therefore, when the impact of cable crossings is included, the Secretary of State considers the total in-combination impact on sandbanks from cable protection to be 4.8 ha.

In line with his conclusions for the impacts of habitat loss from cable protection resulting from the Project alone, the Secretary of State considers that the installation of cable protection can be considered a long-term effect on the Haisborough, Hammond and Winterton SAC and a permanent impact at crossing points. Cable protection measures are likely to impede the restoration of Annex I habitats in the SAC, which are currently in unfavourable condition, for the duration that they are in place. Delays to the restoration of these habitats would be contrary to the conservation objectives of the SAC. The Secretary of State therefore concludes that an adverse effect on integrity on the sandbank feature of the Haisborough, Hammond and Winterton SAC from cable protection from the Project in combination with Norfolk Boreas offshore wind farm cannot be excluded.

5.9.2.3 Increased Suspended Sediments

As discussed in Section 0, the effect of increased suspended sediment on the sandbank feature of the SAC was not included in the Applicant's integrity matrices [REP7-035] or included in the integrity matrices in Annex 3 of the RIES [PD-016]. Again, in their comments on the RIES, NE did not provide specific comment on this impact pathway [REP8-104] nor state objection to its omission in their final SoCG with the Applicant [REP9-046].

[75] Larsen, S. M., Roulund, A. and McIntyre, D. L. (2019). *Regeneration of Partially Dredged Sandwaves*. Coastal Sediments 2019, pp. 3026-3039.

[76] RPS. (2019). *Review of Cable Installation, Protection Mitigation and Habitat Recoverability*. Commissioned by the Crown Estate.

[77] Royal HaskoningDHV (2021) *Norfolk Vanguard Offshore Wind Farm In Principle Habitats Regulations Derogation, Provision of Evidence – Appendix 3 Haisborough, Hammond and Winterton SAC In Principle Compensation (Version 2)*. 21 October 2021.

In relation to increased suspended sediments from the Project in-combination with other plans or projects, the Secretary of State considers that with the mitigation measures secured, an adverse effect on integrity of Haisborough, Hammond and Winterton SAC from this impact can be excluded.

5.9.3 Annex I Reef: Alone

Impacts on reefs could arise from: cable installation; cable repairs during operation; permanent habitat loss from cable protection; and the introduction of new substrates.

The Applicant concluded that there would be no adverse effect on the integrity of the reef feature based on the following assumptions [APP-045]:

- *S. spinulosa* reef is known to recover rapidly after disturbance.
- The use of micro-siting would allow the avoidance of reef features from the Project alone or in combination with Norfolk Boreas offshore windfarm.
- The approach to depositing material cleared during sandwave levelling would ensure that sediment remained in the local transport system so that the sandbank feature would be maintained but would avoid smothering reef features.
- Published scientific evidence shows that *S. spinulosa* is tolerant of disturbance and sediment smothering.
- *S. spinulosa* would rapidly colonise any cable protection and lead to the creation of new reefs.
- Effects from decommissioning would be similar, or of lesser magnitude, than those from construction.
- When the combined effects of the Project and Norfolk Boreas offshore windfarm are considered, the percentage of the feature area or SAC area impacted would still be very small.
- Both projects would use micro-siting to avoid reef features so there would be no in-combination effects on reef features. Even if micrositing could not be undertaken, the total extent of reef feature lost would be no more than 3.7% of the entire feature.

5.9.3.1 Cable Installation

The Applicant's HRAR [APP-045] focussed on the option of micrositing the cable route to avoid the reef feature. In the unlikely event of disturbance, the Applicant considered that reef was capable of recovery.

NE advised that, as the reef in the Haisborough, Hammond and Winterton SAC was currently in unfavourable condition, all reef must be microsited.

NE, the MMO and the Eastern Inshore Fisheries and Conservation Authority ("IFCA") all pointed to proposed fisheries byelaws in the area that could increase the extent of reef and thus make micrositing more difficult. However, the Applicant considers that there is significant uncertainty regarding what effect these measures will have prior to Project construction[78].

In a situation where micrositing is not possible, the Applicant concluded that, given the small proportion of temporary disturbance and the high recoverability of reef, there would be no adverse effect on integrity.

However, NE raised concerns over the evidence presented to support the ability of reef to recover if impacted through cable installation [RR-106][REP1-088][REP4-062].

[78] Vattenfall (2020a). *Norfolk Vanguard Offshore Wind Farm Additional Mitigation Department for Business, Energy and Industrial Strategy (BEIS) Request for information*. Doc. Ref: ExA; Mit; 11.D10.2. 28 February 2020.

The Applicant suggested that if reef has recovered to such an extent that it is not possible to route two 30 m swathes through the 2 – 4 km wide offshore cable corridor, then this would be an extremely large reef and that this would no longer require a restoration target [REP3-004]. The Applicant considered that NE's position is disproportionate and inconsistent when NE also advises that micrositing may not be possible due to significant recovery of reef following around 100 years of extensive and repeated commercial fisheries dredging.

The Applicant noted that NE was seeking complete avoidance of Annex I reef. It explained that in the unlikely event there is not sufficient space to do so, the SIP would require the route through reef which would result in the least temporary disturbance to be subject to further assessment and agreement with the MMO in consultation with NE that the SIP provides the necessary mitigation. The Applicant considered that if avoidance is not possible, cable installation works would be a localised and temporary disturbance to a large reef. If this could not be agreed, construction could not commence and the onus would be on the Applicant to consider alternative solutions in consultation with NE and the MMO.

At the close of Examination, the SoCG between the Applicant and NE [REP9-046] identified a number of matters not agreed in relation to impacts to reef; NE considered that micrositing may not be possible and that it had limited confidence in the ability of reef to recover and it continued to advocate that reef should be avoided. However, in line with its position on sandbanks, NE agreed that the Outline HHW SIP [REP7-026] allowed for a conclusion of no adverse effect on integrity to be made at the consent determination stage.

In relation to operational impacts, the HRAR explained that the maximum disturbance area for cable reburial activities within the SAC was estimated as 100,000 m^2 per cable over the life of the Project (6.8% of the total area of the SAC). It considered that *S. spinulosa* is frequently found in disturbed condition, shows good recoverability and the area affected would be a very small extent of the total area of the SAC.

NE noted that the reef could be repeatedly impacted during construction, and then again from cable repair/reburial during operation. It advised that operation and maintenance activities be excluded from within the site (with the option to apply for a separate Marine Licence at a later date) or be sufficiently restricted. It also highlighted the potential for reef to establish across the cable corridor post-installation which could be affected during maintenance cable remediation activities.

The Applicant explained that maintenance works would be localised (less than 0.001% of the total SAC area) and less than that of construction. The Applicant also noted that the SIP outlined the process for agreeing maintenance activities with the MMO in consultation with NE to ensure there is no adverse effect on integrity. NE agreed at the end of Examination that the HHW SIP combined with Condition 9(1)(m) of the Transmission dMLs allowed a conclusion of no adverse effect on integrity to be made at the consent determination stage.

Subsequent to the High Court judgement which quashed the Secretary of State's original decision to grant development consent for the Project, in addition to NE's request for the Secretary of State to consider the further information requirements set out in the Norfolk Boreas consultation to be addressed in the redetermination of the Project, the Secretary of State requested that the Applicant provide details of information on micrositing, along with further information which demonstrates that all reefs can be avoiding during cable installation[79].

[79] BEIS (2021). *Application by Norfolk Vanguard Limited ("the Applicant") for an Order granting Development Consent for the proposed Norfolk Vanguard Offshore Wind Farm and associated offshore and onshore infrastructure ("the Norfolk Vanguard project")*. 11th October 2021.

The Secretary of State has considered the evidence presented, including that submitted by the Applicant and Interested Parties during the redetermination of the Project, regarding the effects of cable installation on reef features, and how the confidence around the ability to microsite to avoid these features is compromised by the ephemeral nature of the reef and the inability to predict its presence and extent prior to construction. The Secretary of State understands that while there is potentially enough space for the cables to avoid reef features, there is currently a high degree of uncertainty as to what archaeological features might also require avoidance, and the likely discovery of further areas of reef once fisheries management measures are implemented.

The Secretary of State acknowledges that there is insufficient scientific evidence to fully understand the impact of disturbance to reef features from cable installation and their ability to recover. He has carefully considered the advice given by Natural England, as the Government's statutory advisors, and the fact that the Applicant accepts that scientific certainty is not possible to obtain. The Secretary of State therefore concludes that an adverse effect on the integrity of Haisborough Hammond and Winterton SAC from the effects of the cable installation from Project alone on Annex I Reefs cannot be excluded.

5.9.3.2 Cable Protection

In line with its advice for sandbanks, NE also recommended that cable protection should not be permitted anywhere within designated sites as it would result in a permanent change to reefs. It advised that a change of habitat is just as significant as loss of habitat when that habitat is the designated feature [REP1-088]. NE further advised that the deposition of material or other alteration of surface sediment would be likely to lead to a persistent change to substrate which is not suitable habitat for mixed sediment Annex I reef communities [REP1-088]. It did not consider that establishment of *S. spinulosa* on artificial substrate is Annex I Reef as designated because it is not replacement for reef on natural site sediment as set out at the time of designation.

NE advised that without removal of cable protection at decommissioning, the impacts are likely to persist and depending on the location may hinder the conservation objectives of the designated site [REP1-088]. NE also stated that there is no empirical evidence of successful decommissioning where the habitat is returned to its pre-impacted state and that it is not possible to rule out an adverse effect on integrity [RR-106][REP4-062][REP6-032].

The Applicant stated that *S. spinulosa* reef is ephemeral and opportunistic so can be expected to recover/recolonise within the range of natural variation [REP1-007][REP2-003][REP2-031]. It considered that, once the disturbance has ceased, *S. spinulosa* could once again settle and form reef aggregations, including on cable protection, therefore the recovery potential of the SAC would not be limited. It noted that post-construction surveys at Thanet offshore wind farm found a wider distribution of reef aggregation categorised as moderate patchy growth and dense growth compared to pre-construction surveys; less damage to reef where recorded (partially attributed to reduction in bottom fishing activities as a result of offshore wind farm presence); and that although there was a small decline of reef shortly after construction, these were found to be recovering five years after construction [REP8-064].

Furthermore, the Applicant cited studies supporting the assertion that cable protection is suitable habitat for Annex I Reef communities [REP2-003][REP8-064] and maintained that *S. spinulosa* reef would provide the same benefits in terms of biodiversity, regardless of what it is growing on [REP3-004]. The Applicant also highlighted [REP7-039][REP7-059][REP8-064] that the large priority area within a proposed Defra byelaw area extensively tracks existing pipelines and that *S. spinulosa* is found on an existing pipeline within the SAC. It considered that any reef, regardless of what it is growing on, would have the same effect on biodiversity and cited publications which state *S. spinulosa* reef is not sensitive to habitat change and that substrate is not the critical factor for *S. spinulosa* recruitment.

At the close of Examination, the SoCG between the Applicant and NE [REP9-046] identified a number of matters not agreed in relation to impacts to reef; NE continued to advocate that cable protection would result in permanent loss of habitat.

The Applicant agreed that cable protection would not be deployed during operation and maintenance, except in relation to cable protection already deployed.

Following request for further information by the Secretary of State, the Applicant, in the Outline HHW SIP, committed to use no cable protection in the priority areas to be managed as reef within the Haisborough, Hammond and Winterton SAC, unless otherwise agreed with the MMO in consultation with NE. This commitment will ensure there is no habitat loss in the priority areas that have been identified in order to facilitate the recovery of the *S. spinulosa* reef feature to favourable condition. The Applicant shows that there is no overlap between the most likely areas where cable protection could be required and the areas to be managed as reef (Figure 4)[80].

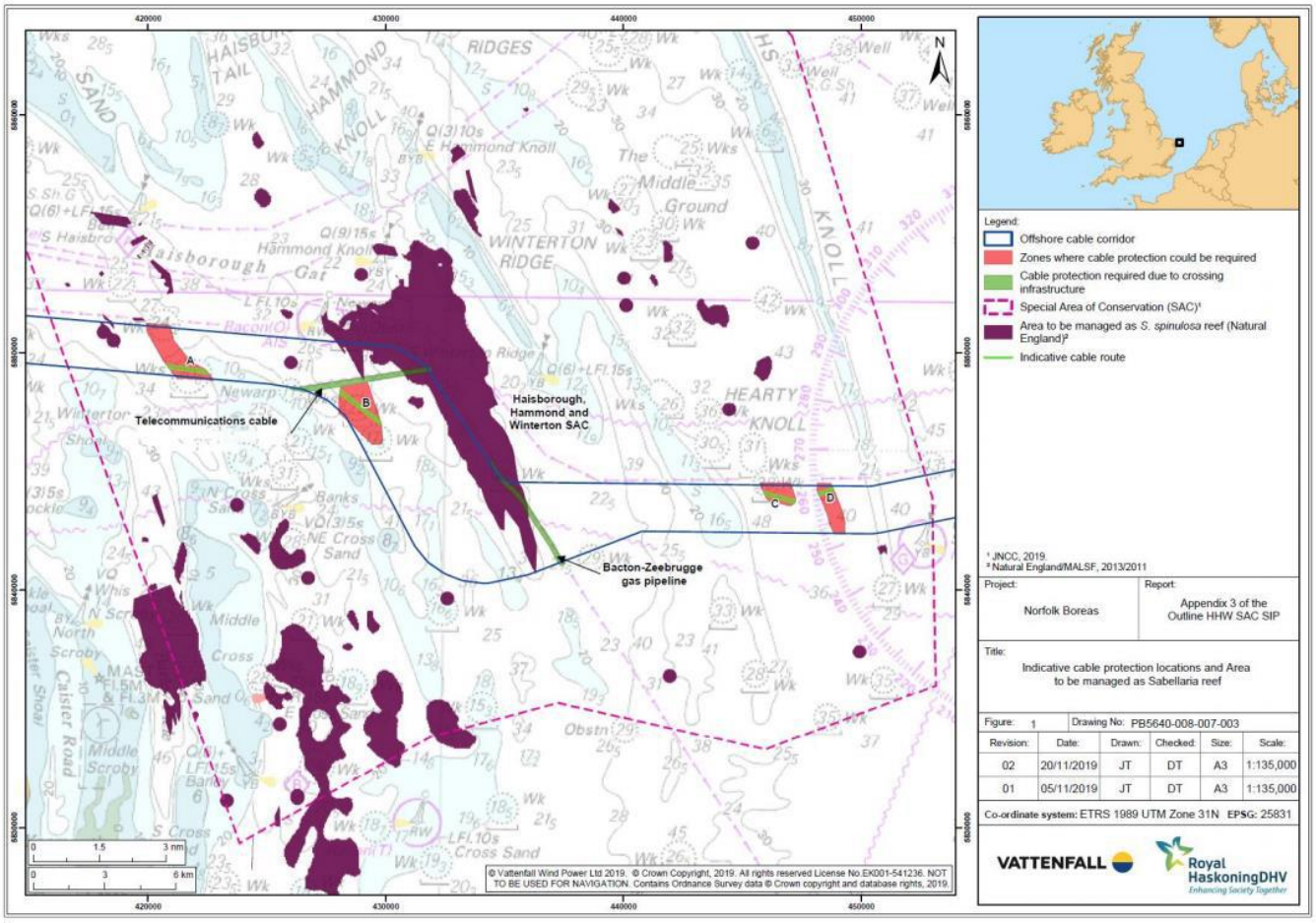

Figure 4: Cable protection locations to be assessed in the assessment of effects of habitat loss on Annex 1 Reef (Source Vattenfall 2020a)

Furthermore, the Applicant committed to the removal of all cable protection at the time of decommissioning where it is associated with unburied cables due to ground conditions (where required

[80] Vattenfall (2020a). *Norfolk Vanguard Offshore Wind Farm Additional Mitigation Department for Business, Energy and Industrial Strategy (BEIS) Request for information*. Doc. Ref: ExA; Mit; 11.D10.2. 28 February 2020

for crossings this will be left *in situ*)[81]. As referred to in Section 5.9.1.2, and the Secretary of State has secured this commitment in the DCO. NE maintain that the placement of cable protection is considered to have a lasting change on the habitat over a period of 30 years (lifetime of the Project) and beyond, as recovery will not be immediate. NE considers that no evidence has been presented that demonstrates what the impacts are likely to be on Annex I habitats and site conversation objectives from such a temporally long time and that habitat recovery is achievable to its pre-impacted state. Therefore, in NE's view, a 30 year change in habitat cannot be considered to be a small scale loss/change. In addition, NE considers that no evidence has been presented on the potential for any wider surrounding area impacts from the presence of the cable protection and its removal. NE also advised that for decommissioning to be considered as mitigation then this would need to be restricted to concrete mattresses (or similar type product)[82].

Subsequent to the High Court judgement which quashed the Secretary of State's original decision to grant development consent for the Project, in addition to NE's request for the Secretary of State to consider the further information requirements set out in the Norfolk Boreas consultation to be addressed in the redetermination of the Project, TWT expressed concerns regarding the impacts of habitat loss within protected areas due to cable protection[83]. As the Haisborough, Hammond and Winterton SAC is in unfavourable condition the TWT stated that future cable protection will impede the recovery of the site.

The Secretary of State requested that the Applicant provide details of modifications to the Project which could avoid the need for cable protection within the SAC (except for cable crossing points)[84].

With consideration of the information presented, including that submitted by the Applicant and Interested Parties during the redetermination of the Project, the Secretary of State agrees with NE that the colonisation of introduced substrates by reef does not count as an Annex I Reef feature and that the addition of any hard substrata is incompatible with the conservation objectives for the SAC and could result in the long-term loss of reef. The Secretary of State concludes that an adverse effect on integrity on the Haisborough, Hammond and Winterton SAC from the effects of cable protection from the Project alone on Annex I Reefs cannot be excluded.

5.9.3.3 Increased Suspended Sediments

Dredged sediment from cable installation activities would not be disposed of within 50 m of *S. spinulosa* reef [APP-045]. This was secured in the SIP which also states that the location(s) of sediment disposal must be informed by pre-construction surveys, and the location and methodology for disposal must be agreed with the MMO in consultation with NE.

In their SoCG with the Applicant [REP9-046], NE agreed that sediment disposal must be a minimum buffer of 50 m from *S. spinulosa* and was content with how this would be secured through the Haisborough, Hammond and Winterton SAC SIP.

[81] Vattenfall (2020a). *Norfolk Vanguard Offshore Wind Farm Additional Mitigation Department for Business, Energy and Industrial Strategy (BEIS) Request for information*. Doc. Ref: ExA; Mit; 11.D10.2. 28 February 2020

[82] Natural England (2020). Natural England (2020). *Norfolk Vanguard – Applicant's submission to Secretary of State Consultation Request for further information*. 27 April 2020

[83] The Wildlife Trusts (2021). *Norfolk Vanguard re-determination*. 15 April 2021.

[84] BEIS (2021). *Application by Norfolk Vanguard Limited ("the Applicant") for an Order granting Development Consent for the proposed Norfolk Vanguard Offshore Wind Farm and associated offshore and onshore infrastructure ("the Norfolk Vanguard project")*. 11th October 2021.

No further comments were received on this topic during the redetermination of the Project. The Secretary of State is therefore satisfied that adverse effects on the integrity of the Haisborough, Hammond and Winterton SAC from suspended sediment from the Project alone on Annex I Reefs can be excluded.

5.9.4 Annex I Reefs: In combination

5.9.4.1 Cable Installation, Cable Protection and Suspended Sediment

The Applicant's in-combination assessment was restricted to Norfolk Boreas as no other plans or projects are considered to have the potential to affect the Haisborough, Hammond and Winterton SAC. The Applicant's assessment [APP-045] notes that installation of the Norfolk Boreas export cables would likely follow that of the Project with no temporal overlap.

The Applicant's HRAR explained that the worst-case scenario reflects reef extending across the full width of the offshore cable corridor, but nowhere else beyond the corridor. It considered that in reality, if reef has extended across the cable corridor, it would likely be a section of a much larger reef and therefore the proportion of temporary disturbance would be significantly smaller.

The maximum area of reef that would be lost to the Project in combination with Norfolk Boreas offshore wind farm would be 0.004% of the SAC area (or 5.9 ha), and 0% of the priority reef management areas. As the Project and Norfolk Boreas share an offshore cable corridor the maximum area of Annex I Reef which could be impacted in combination would be the same as the area which could be impacted by the Project alone.

The Applicant concluded there would be no adverse effect on integrity from the Project and Norfolk Boreas in combination [APP-045][REP8-064].

At the close of Examination, the SoCG between NE and the Applicant [REP9-046] agreed that in-combination impacts with Norfolk Boreas must be considered when developing the SIP. The Outline HHW SIP [REP9-028] required that consideration must be given to Norfolk Boreas to ensure mitigation solutions are compatible for both projects.

The Secretary of State concludes that adverse effects on the integrity of Haisborough, Hammond and Winterton SAC from the effects of temporary physical disturbance and habitat loss from cable protection from the Project in-combination with other plans and projects on Annex I Reefs cannot be excluded.

Due to the measures secured to reduce the impacts of suspended sediments on reefs, the Secretary of State concludes that an adverse effect on the integrity of Haisborough, Hammond and Winterton SAC from increased suspended sediments from the Project in-combination with other plans or projects on Annex I Reefs can be excluded.

5.10 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 Humber Estuary SAC is located approximately 150 km from the Project. 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[85].

The Humber Estuary SAC supports the following qualifying features:

- Atlantic salt meadows;
- Coastal lagoons;
- Dunes with *Hippophae rhamnoides;*
- Embryonic shifting dunes;
- Estuaries;
- Fixed dunes with herbaceous vegetation ("Grey dunes");
- Grey seal;
- Mudflats and sandflats not covered by seawater at low tide;
- River lamprey;
- Salicornia and other annuals colonising mud and sand;
- Sandbanks which are slightly covered by sea water all the time;
- Sea lamprey; and
- Shifting dunes along the shoreline with *Ammophila arenaria* ("White dunes").

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 potential for likely significant effect was identified for the grey seal feature due to the potential for disturbance to occur at haul out sites and at sea foraging grounds and a risk of collision at sea with increased vessel traffic

The SAC is located approximately 150 km from the Project array and 112 km from the offshore cable route; however, the movements of grey seal along the east coast of England could lead to the SAC population being adversely affected. Donna Nook National Nature Reserve ("NNR") is in the southeast of the SAC and supports a large and increasing grey seal breeding colony. The site consists of dunes, slacks and intertidal areas covering more than 10 km of coastline between Grainthorpe Haven in the north and Saltfleet in the south. The site is the most southerly breeding site for grey seal on the east coast and is used from August to December as a breeding ground with pupping occurring between October and January[86]

5.10.1 Grey Seal: Alone

5.10.1.1 Disturbance at Haul out Sites

The Applicant's HRAR [APP-045] assessed the potential effect of vessels at haul out sites. It concluded that vessels would be highly unlikely to be within 300 m of the coast, in areas of close proximity to the seal haul-out sites within the Humber Estuary SAC. On this basis the Applicant concluded that there would be no potential for adverse effect on integrity from the Project alone. NE agreed with the Applicant's conclusion of no adverse effect on integrity on the site [REP1-088].

[85] http://publications.naturalengland.org.uk/publication/5009545743040512

[86] https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK0030170&SiteName=humber&countyCode=&responsiblePerson=&SeaArea=&IFCAArea&HasCA=1&NumMarineSeasonality=8&SiteNameDisplay=Humber%20Estuary%20SAC

The Secretary of State is content that the risk of disturbance at haul sites is low and concludes that an adverse effect on the integrity of The Humber Estuary SAC, from the effects of disturbance at haul out sites on grey seal from the Project alone can be excluded.

5.10.1.2 At Sea Disturbance

The Applicant's HRAR provided an estimate for the number of seals temporary disturbed in the array and cable corridor by activities occurring during the construction and operation of the Project. The maximum number of grey seals temporary disturbed was 5 in the wind farm area and 38 in the corridor. Assuming all seals were from the Humber Estuary, the Applicant calculated this would equate to 1% of the SAC population.

With consideration of the distance of the site from the Project, the Applicant determined that it would be highly unlikely, especially taking into account the movements of tagged seals, that all grey seal in the offshore development area would be from the Humber Estuary SAC. This position was not disputed by any Interested Party.

In relation to at-sea disturbance the Secretary of State has reviewed the worst-case figures presented and has noted the low likelihood of all seals originating from the Humber Estuary SAC. On this basis of this assessment the Secretary of State concludes that an adverse effect on the integrity of The Humber Estuary SAC, from the effects of at sea disturbance on grey seal from the Project alone can be excluded.

5.10.1.3 Grey Seal Collision

The Applicant's HRAR provided approximate figures for the number of vessel movements expected from the Project's construction (operational movements are unlikely to be near the Humber Estuary SAC given the expected operation and maintenance ports are in East Anglia): 1,180 vessel movements over the two to four year indicative offshore construction window, with an average of approximately two vessel movements per day. However, the Applicant expected that seals would be able to detect the presence of vessels and, given that they are highly mobile, would be able to largely avoid vessel collision. This conclusion was not disputed by any Interested Party.

The Secretary of State agrees with the above rational and concludes that an adverse effect on the integrity of The Humber Estuary SAC, from the effects of grey seal vessel collisions from the Project alone can be excluded.

5.10.2 Grey Seal: In-combination

5.10.2.1 Disturbance at Haul Out Sites

The Applicant's HRAR [APP-045] assessed the potential effect of vessels at haul out sites. It concluded that vessels would be highly unlikely to be within 300 m of the coast, in areas of close proximity to the seal haul-out sites within the Humber Estuary SAC. On this basis the Applicant concluded that there would be no potential for an adverse effect on integrity from the Project in-combination with other plans or projects. NE agreed with the Applicant's conclusion of no adverse effect on integrity on the site [REP1-088].The Secretary of State is content that the risk of disturbance at haul sites is low and concludes that an adverse effect on the integrity of The Humber Estuary SAC, from the effects of disturbance at haul out sites on grey seal from the Project alone and in combination with other plans or projects can be excluded.

5.10.2.2 At Sea Disturbance

The Applicant's HRAR provided an estimate for the number of seals temporary disturbed from the Project in-combination with other plans or projects by activities occurring during the construction and operation phases. The maximum number of grey seals temporary disturbed was estimated to be 1,371[87]. Assuming all seals were from the Humber Estuary, the Applicant calculated this would equate to 34% of the SAC population.

However, the Applicant considered that given the wide range of plan/project locations over the Southern North Sea area used in this in combination assessment it is highly unlikely that all disturbed seals would be from the Humber Estuary SAC. Furthermore, given the distance between the projects included in the in-combination assessment and their respective distances from the coast, it is not anticipated that foraging grey seal would be significantly displaced from foraging areas or moving between haul-out sites and foraging areas. On this basis the Applicant considered that there would not be an adverse effect on integrity on the Humber Estuary SAC.

This position was not disputed by any Interested Party.

In relation to at-sea disturbance the Secretary of State has reviewed the worst-case figures presented and has noted the low likelihood of all seals originating from the Humber Estuary SAC. The Secretary of State concludes that an adverse effect on the integrity of The Humber Estuary SAC, from the effects of at sea disturbance on grey seal from the Project alone and in combination with other plans or projects can be excluded.

5.10.2.3 Grey Seal Collision

The Applicant's HRAR states during construction, vessel movements to and from any port will be incorporated within existing vessel routes. Seals present in the area will be accustomed to the presence of vessels, therefore any additional vessel movements associated with the construction of the Project would be part of the current baseline. Further, any increase in vessel movements during the operation and maintenance of the Project would be relatively small in relation to current ship movements in the area.

As there is already a large number of vessel movements in the area of the Humber Estuary, any increase in vessel movements associated with the projects included in the in-combination assessment is likely to be relatively small in relation to current ship movements in the area.

On this basis, the Applicant concluded that there would be no potential adverse effect on the integrity of the grey seal feature of the Humber Estuary SAC from the Project in combination with other plans or projects. NE agreed with the Applicant's conclusion of no adverse effect on integrity on the site [REP1-088].

The Secretary of State agrees with the above rational and concludes that an adverse effect on the integrity of The Humber Estuary SAC, from the effects of grey seal vessel collisions from the Project alone and in-combination with other plans or projects can be excluded.

5.11 Appropriate Assessment: Norfolk Valley Fens SAC

The Norfolk Valley SAC covers an area of 616.21 ha and is located approximately 570 m south of the onshore Project area. The site is comprised of valley-head spring-fed fens. Individual fens vary in their

[87] Note this figure includes UXO clearances and seismic surveys which are subject to separate licencing.

structure according to intensity of management and provide a wide range of variation with associated rich flora[88].

The Norfolk Valley Fens SAC supports the following qualifying features:

- Northern Atlantic wet heaths with *Erica tetralix* (Wet heathland with cross-leaved heath);
- European dry heaths;
- Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (Dry grasslands and scrublands on chalk or limestone);
- *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) (Purple moor-grass meadows);
- Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* (Calcium-rich fen dominated by great fen sedge (saw sedge));
- Alkaline fens (Calcium-rich springwater-fed fens);
- Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) (Alder woodland on floodplains);
- Narrow-mouthed whorl snail; and
- Desmoulin`s whorl snail;

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 potential for likely significant effect was identified for all the above listed features due to indirect effects on features present within *ex-situ* habitats of the SAC arising from groundwater / hydrology effects during all phases of development, alone and in-combination with other plans or projects.

5.11.1 Changes to groundwater flow: Project alone and in-combination

The Applicant's assessment explained that Booton Common SSSI, one of the five component SSSIs of the Norfolk Valley Fens SAC, has a functional connection to the onshore project area [APP-045][REP7-035]. The qualifying features present at Booton Common are water-sensitive and reliant on the Blackwater Drain to maintain their structure and function. The proposed onshore cable route is not located within the Blackwater Drain, but trenched crossing techniques are proposed at two of its tributaries. Following construction at these locations, reinstatement of the trench would be conducted to the pre-construction depth of the watercourse and the dams removed. As water flow would be maintained and given the distance of these sites from Booton Common, the Applicant concluded that effects from trenching works at these locations upon the Blackwater Drain would be minimal.

However, NE considered that there was insufficient evidence to assess impacts of changes in groundwater flow to the qualifying features present at Booton Common SSSI [RR-106]. It advised that further information be obtained from the EA (eg WetMec data showing water supply mechanisms for all the component sites and/or EA's groundwater modelling) to undertake a detailed appraisal of groundwater effects at both Norfolk Valley Fens SAC.

The Applicant's first clarification note regarding groundwater dependent designated sites confirmed that the Norfolk Valley Fens SAC is predominantly surface water fed, but also partly groundwater fed from the underlying chalk aquifer [REP1-049]. It concluded that there is no direct pathway between construction works and the underlying chalk aquifer. Therefore, a detailed groundwater assessment was not considered necessary [REP1-007]. However, NE noted WetMec data had not been provided and

[88] http://publications.naturalengland.org.uk/publication/6684666086031360

considered that there remained insufficient information to provide a substantive response [REP1-088][REP2-036].

NE also noted that the Hornsea Project Three cable route passes about 360 m to east of Booton Common and that construction periods may overlap. As such, it suggested that the in-combination assessment for Norfolk Valley Fens SAC be revisited [REP1-007][REP4-040].

The Applicant's revised Onshore Ecology Clarification Note included a conceptual model of groundwater flows using WetMec data to provide further clarity regarding groundwater flows for the site [REP6-013]. This explained that the onshore cable trenching and trenchless crossing activities associated with the onshore project construction phase would remain at least 7 m above the chalk aquifer at any point and would be separated from the chalk aquifer by the boulder clay aquiclude. As such, the Applicant concluded there is no pathway between the onshore project area and any of the protected sites. The Applicant did not consider that an in-combination assessment with Hornsea Project Three was required [REP1-007][REP4-040].

NE [REP9-046] subsequently confirmed that it was satisfied with the information supplied and that the design of all watercourse crossings, diversions and reinstatement would be submitted to and approved by the relevant planning authority in consultation with NE, prior to the commencement of each stage of the onshore transmission works (as secured through Requirement 25 of the DCO [REP9-007]). It agreed that there would be no adverse effect on integrity on Norfolk Valley Fens SAC alone or in-combination with Hornsea Project Three. The ExA was content that an adverse effect on integrity on Norfolk Valley Fens SAC from changes in groundwater flow could be excluded from the Project alone and in combination with other plans or projects.

Based on the above, the Secretary of State concludes that an adverse effect on the integrity of the North Valley Fens SAC from the effects of changes to groundwater flow from the Project alone and in-combination with other plans or projects can be excluded.

5.11.2 Sedimentation: Project alone and in-combination

NE raised concerns about the level of detail within the CoCP regarding measures to safeguard the Norfolk Valley Fens SAC in relation to sediment control and reinstatement of all work areas [RR-106][REP1-088]. The Applicant responded with an Onshore Ecology Clarification Note to clarify its approach to onshore construction works within functional floodplains and identified mitigation measures to minimise the risk of sediment or pollutant release [REP6-013]. It clarified its approach to grassland reinstatement and captured these commitments in the outline CoCP [REP7-006].

NE subsequently confirmed it had withdrawn its concerns. It agreed that the site-specific management plans required for each watercourse crossing (Requirement 25 of the DCO) would include site specific details regarding sediment management and pollution prevention measures and would lead to no adverse effect on integrity on the Norfolk Valley Fens SAC [REP7-075][REP9-046]. The ExA was content that the Applicant had demonstrated that its measures to control sediment and for reinstatement/restoration would not result in an adverse effect on integrity on the Broads SAC from the Project alone and in combination with other plans or projects. The ExA was satisfied that Requirement 25 of the DCO provides adequate means to secure ant necessary mitigation.

Based on the above, the Secretary of State concludes that an adverse effect on the integrity of the North Valley Fens SAC from the effects of changes to sedimentation from the Project alone and in-combination with other plans or projects can be excluded.

5.12 Appropriate Assessment: Paston Great Barn SAC

The Paston Great Barn SAC covers an area of 0.95 ha and is located approximately 2.9 km north east of the onshore Project location. The SAC is the only known example of a maternity roost of barbastelle bats *Barbastella barbasellus* in a building for which the site is designated. The Barn is a 16th century thatched barn with associated outbuildings. The maternity colony of barbastelles utilises a range of cracks and crevices in the roof timbers for roosting[89].

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 potential for a likely significant effect was identified for the Barbastelle bat feature due to the direct effects in *ex-situ* habitats and indirect effect in *ex-situ* habitats from light and groundwater/hydrology effects arising from the onshore cable route construction, and noise disturbance during construction, alone and in-combination with other plans or projects.

5.12.1 Barbastelle Bat Disturbance: Alone

5.12.1.1 Direct effects in *ex-situ* habitats

The HRAR explains that approximately 11 ha of habitat used by Barbastelle bats of the Paston Great Barn SAC maternity colony is anticipated to be isolated by hedgerow removal during the construction phase [APP-045]. This represents approximately 0.6% of the home range of the Paston Great Barn SAC maternity colony. The Applicant considers that once replanted hedgerows have reached maturity (expected to be 3 – 7 years following planting on completion of construction), they would provide an improved commuting and foraging habitat for bats. The Applicant concludes that following mitigation, these small-scale, temporary effects would not result in an adverse effect on integrity.

However, NE considered that there was insufficient information to assess the significance of the loss and severance of foraging and commuting habitat for Barbastelle bats over a construction period of at least seven years [RR-106][REP1-088][REP2-037]. It considered that the HRAR did not recognise the heterogeneity of hedgerows and how they may be used by Barbastelle bats [REP1-049]. It requested more information about each hedgerow to be removed and woodland to be fragmented, plus an estimate of recovery timescales [RR-106]. NE also suggested a requirement for a mitigation plan prior to hedgerow removal and that hedgerows should be monitored for seven years or until they have reached the same or better quality than before they were removed [RR-106][REP2-036][REP6-032].

The Applicant provided a clarification note which confirmed that 130 m of hedgerow within 5 km of Paston Great Barn SAC would be temporarily removed during construction; 82 m of which support foraging Barbastelle bats [REP1-049]. The Applicant reiterated that detailed bat and hedgerow mitigation measures are captured within the OLEMS [APP-031] and secured through Requirement 24 of the DCO (Ecological Management Plan), which would require consultation with NE prior to discharge. Nevertheless, NE [REP2-036] advised that the development has the potential to affect the Supplementary Advice to Conservation Objectives Target[90] to "*Maintain the presence, structure and quality of any linear landscape features which function as flight lines*".

The Applicant submitted an updated version of the Onshore Ecology Clarification Note [REP6-013] which included additional information regarding the extent of available alternative foraging habitat, the location of habitat potentially temporarily fragmented from construction and the location of hedgerows temporarily

[89] http://publications.naturalengland.org.uk/publication/6035066643808256

[90] http://publications.naturalengland.org.uk/publication/6035066643808256

affected during construction. Further to a review of the note, NE confirmed that it had withdrawn its concerns and agreed with the Applicant's assessment of no adverse effect on integrity of the Barbastelle population of the Paston Great Barn SAC [REP6-032][REP7-075].

However, NE still advised that an OLEMS/Environmental Management Plan ("EMP") should include the improvement of hedgerows either side of the section to be removed and that the mitigation plan should be in place for 7 years or until hedgerow has fully recovered [REP6-032][REP7-075]. The Applicant updated section 7.3.3 of the OLEMS [REP7-008], however NE [REP8-104] noted that a full hedgerow mitigation plan was not submitted, therefore it could not provide further comment.

Matters related to the Paston Great Barn SAC were noted as agreed in the final SoCG with NE [REP9-046].

On the basis that measures for hedgerow mitigation and monitoring have been adequately secured, the ExA was satisfied that an adverse effect on the integrity of Paston Great Barn SAC could be ruled out from the Project alone.

The Secretary of State is content to conclude that an adverse effect on the integrity of the Paston Great Barn SAC from direct effects in *ex-situ* habitats from the Project alone can be excluded.

5.12.1.2 Indirect effects in *ex-situ* habitats from light and groundwater/hydrology effects

The HRAR explains that construction of the Project will have a small, localised effect upon surface water flows. As approximately 130 m of commuting and foraging habitat located within the home range of the maternity colony will be temporarily lost due to the construction phase, commuting and foraging habitats will not be present at this location and will therefore not be affected. A pre-construction drainage plan will also be developed and implemented to minimise water within the cable trench and ensure ongoing drainage surrounding land.

Construction phase lighting will be used between 7am – 7pm only if required. Lighting will only be used overnight at trenchless crossing locations. Lighting may therefore be needed for 8 weeks at Dilham Canal and land east of Dilham canal. Any lighting used will be directional. No lighting will be required during the operational phase of the Project.

The Applicant concluded that there will be no adverse effect on the integrity of the Paston Great Barn SAC from the Project alone as a result of indirect effects in *ex-situ* habitats from light and groundwater/hydrology effects [APP-045].

Matters related to the Paston Great Barn SAC were noted as agreed in the final SoCG with NE [REP9-046].

The ExA was satisfied that an adverse effect on the integrity of Paston Great Barn SAC could be ruled out from the Project alone.

The Secretary of State is content to conclude that an adverse effect on the integrity of the Paston Great Barn SAC from indirect effects in *ex-situ* habitats from the Project alone can be excluded.

5.12.1.3 Noise disturbance during construction

The Applicant's HRAR explained that construction noise effects would be restricted to the working hours of 7am – 7pm Monday – Friday and therefore were screened out [APP-045]. The Applicant considered this to be an inherent feature of the Project [REP1-007]. However, NE advised that it considered this to be mitigation [REP1-088]. On the basis of the People Over Wind and Sweetman vs Coillte Teoranta (2018) ("the People over Wind judgement"), the ExA progressed this impact onto the integrity matrix provided in Annex 3 of the RIES.

No matters relating to noise disturbance on Barbastelle bats of the SAC from noise disturbance were discussed during Examination.

The Secretary of State is content to conclude that an adverse effect on the integrity of the Paston Great Barn SAC from the effects of noise disturbance during construction from the Project alone can be excluded.

5.12.2 Barbastelle Bat Disturbance: In-combination

5.12.2.1 Direct effects in *ex-situ* habitats

The Applicant identified potential for in-combination impacts with:

- Norfolk Boreas Offshore Wind Farm;
- Bacton Gas Terminal Coastal Protection; and
- Bacton Coastal Protection Scheme.

Both the Bacton Gas Terminal Coastal Protection and the Bacton Coastal Protection Schemes were due to be completed prior to any pre-construction work associated with the Project is due to commence.

Onshore works for the Norfolk Boreas Offshore Wind Farm would not entail any additional hedge removal, although a 6 m gap would be retained for an additional two years during the construction phase of Norfolk Boreas Offshore Wind Farm.

The Applicant determined that the in-combination impacts would not cause an adverse effect on the integrity of the site [APP-045].

As with the Project alone, matters related to the Paston Great Barn SAC were noted as agreed in the final SoCG with NE [REP9-046].

On the basis that measures for hedgerow mitigation and monitoring have been adequately secured, the ExA was satisfied that an adverse effect on the integrity of Paston Great Barn SAC could be ruled out from the Project in-combination with other plans or projects.

The Secretary of State is content to conclude that an adverse effect on the integrity of the Paston Great Barn SAC from direct effects in *ex-situ* habitats from the Project in-combination with other plans or projects can be excluded.

5.12.2.2 Indirect effects in *ex-situ* habitats from light and groundwater/hydrology effects

The HRAR explained that as Norfolk Boreas Offshore Wind Farm will use the cable ducts installed for the Project, there will not be a requirement for further trenching works during construction. The lighting requirements for Norfolk Boreas Offshore Wind Farm will also adhere to those for the Project so would not change the effects identified for the Project alone. Construction of the Bacton Gas Terminal coastal protection project and the Bacton Coastal Protection Scheme will be completed prior to the Project and therefore not overlap.

The Applicant determined that the in-combination impacts would not cause an adverse effect on the integrity of the site [APP-045].

As with the Project alone, matters related to the Paston Great Barn SAC were noted as agreed in the final SoCG with NE [REP9-046].

The ExA was satisfied that an adverse effect on the integrity of Paston Great Barn SAC could be ruled out from the Project in-combination with other plans or projects.

The Secretary of State is content to conclude that an adverse effect on the integrity of the Paston Great Barn SAC from indirect effects in *ex-situ* habitats from the Project in-combination with other plans or projects can be excluded.

5.12.2.3 Noise disturbance during construction

As noted in Section 5.12.1.3, the ExA progressed the effects of noise disturbance during construction to the integrity matrix of Annex 3 of the RIES on the basis of the People over Wind judgement.

No matters relating to noise disturbance on Barbastelle bats of the SAC from noise disturbance were discussed during Examination.

The Secretary of State is content to conclude that an adverse effect on the integrity of the Paston Great Barn SAC from the effects of noise disturbance during construction from the Project alone can be excluded.

5.13 Appropriate Assessment: River Wensum SAC

The River Wensum SAC covers an area of 381.74 ha and lies within the onshore Project area. The Wensum is a naturally enriched, calcareous lowland river. The upper reaches are fed by springs that rise from the chalk and by run-off from calcareous soils rich in plant nutrients. This gives rise to beds of submerged and emergent vegetation characteristic of a chalk stream. Further down the river, the chalk is overlain with boulder clay and river gravels, resulting in aquatic plant communities more typical of a slow-flowing river on mixed substrate[91].

The River Wensum SAC supports the following qualifying features:

- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (Rivers with floating vegetation often dominated by water-crowfoot);
- Desmoulin`s whorl snail;
- White-clawed (or Atlantic stream) crayfish;
- Brook lamprey; and
- Bullhead.

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 potential for likely significant effect was identified on the above listed features due to direct effects within the *ex-situ* habitats of the SAC and direct effects on land within the SAC boundary during construction, impacts from alterations to geology and land contamination, and disturbance due to groundwater/hydrological changes during all phases of the Project, alone and in-combination with other plans or projects.

5.13.1 Direct effects within the *ex-situ* habitats of the SAC and direct effects on land within the SAC boundary: Alone and in-combination

The Applicant considered trenchless crossings to screen out direct effects at the River Wensum SAC to be an inherent feature of the Project. However, NE advised that it considered this to be mitigation [REP1-088]. On the basis of the People over Wind judgement, the ExA progressed this impact onto the integrity matrix provided in Annex 3 of the RIES. No matters relating to direct effects upon qualifying features of the SAC from trenchless crossing were discussed during the examination.

[91] http://publications.naturalengland.org.uk/publication/6039440396910592

The Applicant's HRAR [APP-045] and updated integrity matrix [REP7-035] explained that features are not present within the drains and ditches of the floodplain habitats of the River Wensum on the right-hand (southern) bank of the river. The drain on the left-hand (northern) bank of the river is located outside of the proposed trenchless crossing technique zone. Therefore, potential direct effects upon this habitat have been avoided at this location. Additionally, given the absence of these features from the other ex-situ habitats located within the onshore project area, the Applicant considered unlikely that habitat is present within this drain. This conclusion was not disputed by any Interested Party.

The Secretary of State is content to conclude that an adverse effect on the integrity of the River Wensum SAC from direct effects within the *ex-situ* habitats of the SAC and direct effects on land within the SAC boundary from the Project alone and in-combination with other plans or projects can be excluded.

5.13.2 Impacts from alterations to geology and land contamination, and disturbance due to groundwater/hydrological changes: Alone and in-combination

NE raised concerns about the level of detail within the CoCP regarding measures to safeguard the River Wensum SAC in relation to sediment control and reinstatement of all work areas [RR-106][REP1-088]. The Applicant responded with an Onshore Ecology Clarification Note to clarify its approach to onshore construction works within functional floodplains and identify mitigation measures to minimise the risk of sediment or pollutant release [REP6-013]. It clarified its approach to grassland reinstatement and captured these commitments in the outline CoCP [REP7-006].

NE subsequently confirmed it had withdrawn its concerns. It agreed that the site-specific management plans required for each watercourse crossing (Requirement 25 of the DCO) would include site specific details regarding sediment management and pollution prevention measures and would lead to no adverse effect on the integrity of the River Wensum SAC [REP7-075][REP9-046].

On the basis that sufficient mitigation measures have been adequately secured, the Secretary of State concludes that an adverse effect on the integrity of the River Wensum SAC due to sedimentation from the Project alone and in-combination with other plans or projects can be excluded.

5.14 Appropriate Assessment: The Southern North Sea SAC

The Southern North Sea ("SNS") 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 369,5100 ha and overlapping with the Project. A mix of habitats, such as sandbanks and gravel beds, cover the seabed and water depths range from mean low water to 75 m. The majority of the site has water depths of less than 40 m.

The only qualifying feature is harbour porpoise (*Phocoena phocoena*). The SAC has two seasonal components that reflect harbour porpoise distribution in the winter and summer seasons (Figure 5). The northern part of the SAC is mainly used by harbour porpoise in the summer months while the southern part is mainly used in the winter. The offshore windfarm element of the Project is located in the summer SAC area.

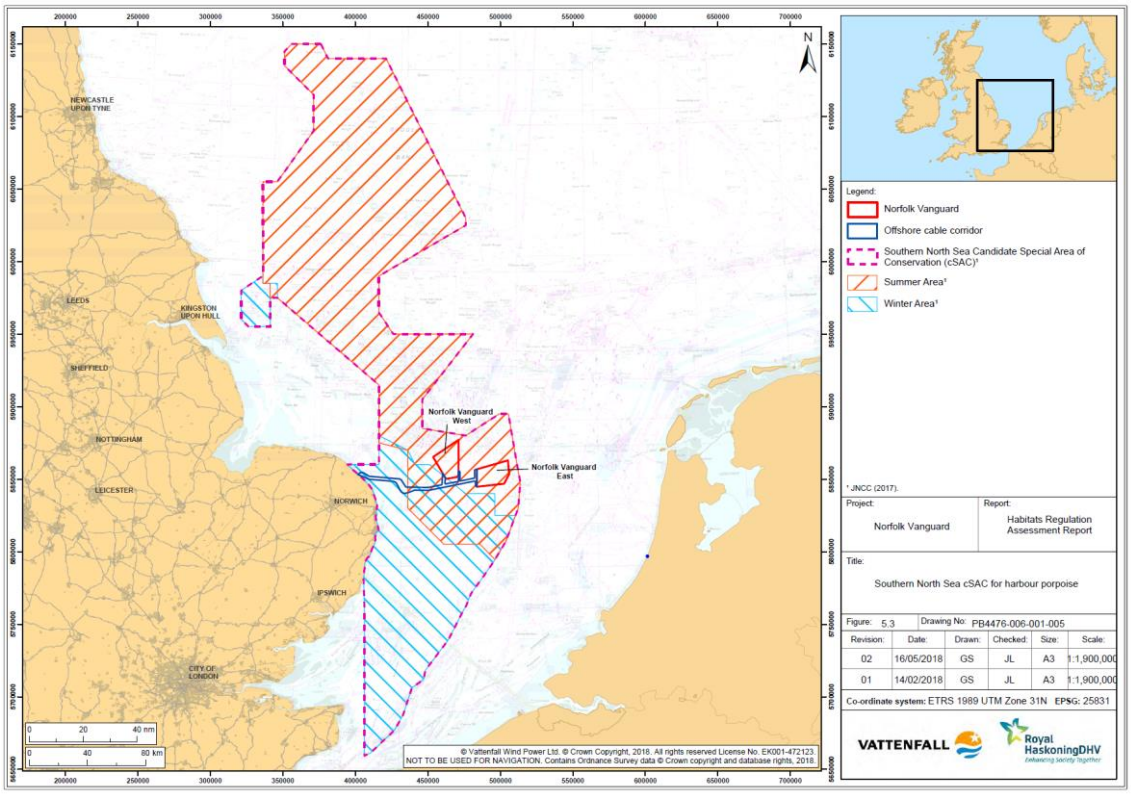

Figure 5: SNS SAC and location of Norfolk Vanguard offshore wind farm.

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:

- Auditory injury from underwater noise;
- Disturbance from underwater noise;
- Vessel disturbance and collision;
- Changes to prey resource; and
- Changes to water quality.

Note that unexploded ordnance ("UXO") detonations have not been considered as part of this AA. Whilst the Applicant provided information on expected UXO clearances, it was agreed by the MMO [REP9-045] and NE [REP9-046], that the matter of UXO clearance would be licenced separately by the MMO and is outwith the DCO process.

5.14.1 Harbour Porpoise: Alone Assessment

5.14.1.1 Auditory injury

Marine mammal auditory injury can occur at close proximities to the loud sounds created during piling. In some cases, severe injury can lead to mortality.

The Secretary of State notes that the Applicant screened the potential for auditory injury out for further assessment, based on the inclusion of a Marine Mammal Mitigation Protocol ("MMMP"). A final draft MMMP was provided at Deadline 9 [REP9-021], but there is a secured commitment to update this prior

to construction through Condition 19(3) of the Generation Asset dMLs (Schedules 9 and 10) and Condition 14(1) of the Transmission dMLs (Schedules 11 and 12) within the DCO).

Despite the Applicant's assurances on screening, the ExA has advised the Secretary of State that the 2018 ruling by the Court of Justice of the European Union ("the CJEU") on the interpretation of the Habitats Directive in the case of People Over Wind and Sweetman vs Coillte Teoranta (2018) ("the People over Wind judgement"), confirmed that mitigation should not be taken into account when determining a likely significant effect for protected sites with the UK's National Site Network.

The Secretary of State also notes and agrees with the ExA that, notwithstanding this point, sufficient information has been provided by the Applicant to enable an AA to be undertaken. Therefore, the Secretary of State has proceeded to include the MMMP and its suitability as mitigation for marine mammal auditory injury in his AA below.

The Secretary of State notes that a MMMP for piling operations can involve the establishment of a suitable measures such as the use of a mitigation zone around the piling location before the event, with use of soft starts, marine mammal observers and deployment of Acoustic Deterrent Devices ("ADDs"). The Applicant has committed to ensure that the mitigation measures are adequate to ensure no marine mammals are present within the mitigation zone prior to any piling event, to reduce the risk of auditory injury.

The final methods for achieving the mitigation zone will be agreed in consultation with the relevant SNCBs and secured as commitments within the final MMMP, based on the most suitable techniques and current guidance.

In relation to representations made on the MMMP, the Secretary of State notes that Whale and Dolphin Conservation ("WDC") and TWT raised concerns over effectiveness of soft-start piling to reduce potential effects on marine mammals, however NE confirmed that it considered that the proposed soft-start protocol would be fit for purpose and that the MMMP and the SIP will contain appropriate mitigation measures once they are agreed and finalised to address an adverse effect on integrity alone [REP4-062].

In view of the MMMPs inclusion within the dMLs and DCO, the Secretary of State is satisfied that the risk of auditory injury from piling event has been sufficiently reduced. On this basis, the Secretary of State concludes that an adverse effect on the integrity of the SNS SAC from the effects of potential auditory injury to harbour porpoise as a result of the Project alone can be excluded.

5.14.1.2 Disturbance from underwater noise

The Applicant assessed the level of disturbance in relation to several activities associated with the wind farm including piling.

Assessment of the potential level of disturbance from these activities followed the then draft guidance provided by NE, which advocated the following spatial approach[92]:

- Displacement of harbour porpoise should not exceed 20% of the seasonal component of the SAC area at any one time and/or on average exceed 10% of the seasonal component of the SAC area over the duration of that season;
- The effect of the project should be considered in the context of the seasonal components of the SAC area, rather than the SAC area as a whole;

[92] The SNCBs have since issued the final version of the Guidance JNCC, Natural England and DAERA (2020). *Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (England, Wales & Northern Ireland)*.

- A distance of 26 km from an individual percussive piling location should be used to assess the area of SAC habitat harbour porpoise may be disturbed from during piling operations; and
- A buffer of 10 km (has since been increased to 12 km) around seismic operations and 26 km around UXO detonations used to assess the area of SAC habitat harbour porpoise may be disturbed.

The Applicant's assessment demonstrated that both the 20% and 10% thresholds would not be exceeded for any activity associated with the construction and operation of the Project [APP-045]. For information purposes, the Applicant also looked at this effect in the context of the North Sea Management Unit ("MU") population of harbour porpoises and estimated that less than 1% of this population would be temporarily disturbed.

In view of the Applicant's assessment NE advised the ExA that the disturbance from the Project alone would not have an adverse effect on integrity of the SNS SAC [RR-106][REP3-051].

Other Interested Parties did not support the position taken by NE and the Applicant. WDC and TWT did not agree with the SNCB guidance on noise management, stating that the area-based thresholds are not underpinned by evidence [REP1-061][REP1-062][REP1-123][REP4-072][REP8-110]. Therefore, they did not agree with the Applicant's conclusions and considered that the spatial and temporal thresholds would be breached. Both parties requested that limits were placed on noise levels during construction [RR-013][RR-172]; TWT noted that this approach is based on scientific data and is used in Germany, the Netherlands and Belgium and should be applied to ensure consistency across the SNS [RR-172][REP3-063][REP4-072].

The Applicant's response to this was that whilst other countries may place noise limits on the construction phase, at present there is a lack of evidence about how noise limits could be implemented effectively.

In its recommendation to the Secretary of State, the ExA did not consider there to be a persuasive argument to depart from the approach outlined in NE's draft guidance. The ExA enquired as to whether there existed any further relevant scientific evidence or justification that casts doubt on this approach [PD-012], but no additional evidence was provided.

The Secretary of State has considered the representations made by the Applicant, NE, WDC and TWT, and the recommendation as made by the ExA. The Secretary of State notes that NE agree with the Applicant that disturbance from underwater noise from piling events and other construction/operational activities from the Project alone would not lead to an adverse effect on the integrity of the SNS SAC. On this basis, the Secretary of State concludes that an adverse effect on the integrity of the SNS SAC from the effects of disturbance to harbour porpoise from underwater noise as a result of the Project alone can be excluded.

5.14.1.3 Vessel interaction (disturbance and collision)

It is possible that harbour porpoise could be disturbed by increased vessel activity. An increased number of vessels also increases the chance of collision.

Indicative daily vessel movements (return trips to a local port) during construction of the Project are estimated to be an average of two per day at both construction and operation phases. The maximum number of vessels on site at any one time would be 57.

It is expected that harbour porpoise would be able to detect the presence of vessels and, given that they are highly mobile, would be able to largely avoid vessel collision. Nevertheless, for assessment purposes it was assumed that the number of animals that could be affected as a result of collision during

construction and operation is the number of animals that could be present in the wind farm area and the cable route.

NV West area (29,500 ha) is approximately 1% of the summer SNS SAC area, the NV East area (29,700 ha) is also approximately 1% of the summer SAC area. The total offshore cable corridor area (23,700 ha) is less than 1% of the summer SAC area and less than 2% of the winter SAC area. Displacement of harbour porpoise would not exceed 20% of the seasonal component of the SNS SAC at any one time, nor would it exceed the 10% seasonal component.

Assuming a 90-95% avoidance rate the Applicant predicted that 0.03% or less of the North Sea MU reference population could be at increased risk based on the worst-case scenario.

On this basis the Applicant concluded that vessel disturbance and collision from the Project alone would not result in an adverse effect on integrity on the harbour porpoise feature of the SNS SAC. This conclusion was not disputed by any Interested Party.

Neither NE nor the ExA commented specifically on the effects of vessel interaction. However, in its SoCG with the Applicant, NE agreed that there would be no adverse effect on the integrity of the SNS SAC as a result of the Project alone [REP9-046].

On this basis, the Secretary of State concludes that an adverse effect on the integrity of the SNS SAC from the effects of vessel interaction with harbour porpoise as a result of the Project alone can be excluded.

5.14.1.4 Changes to prey resource

Potential effects on fish species during construction can result from physical disturbance and temporary loss of seabed habitat; increased suspended sediment concentrations and sediment re-deposition; and underwater noise (that could lead to mortality, physical injury, auditory injury or behavioural responses).

To assess the effects of underwater noise on prey species, the Applicant took into account the distribution ranges of prey species, including areas used as spawning grounds, in the context of the potential ranges where injury or disturbance could occur.

For consideration of physical disturbance and temporary loss of habitat to fish prey during construction, the Applicant calculated that there could be 1,570 ha in total for the Project and 1,300 ha for the offshore cable corridor.

Similarly, the impact on prey from any increased suspended sediment concentrations and sediment re-deposition would be low, with only a small proportion of fine sand and mud staying in suspension long enough to form a passive plume.

Potential effects on fish species during operation and maintenance can result from permanent loss of habitat; introduction of hard substrate; operational noise; and electromagnetic fields (“EMF”). None of these impact pathways were considered to constitute an adverse effect.

The introduction of hard substrate, such as turbines, foundations and associated scour protection as well as cable protection, associated with the Project would increase habitat heterogeneity through the introduction of hard structures in an area predominantly characterised by soft substrate habitat. However, any hard substrate would occupy discrete areas and the relatively small areas of the infrastructure. During operation, the worst-case total area of habitat loss has been estimated to be up to 1,175 ha in total.

The areas potentially affected by EMFs generated by the worst-case scenario offshore cables are expected to be small, limited to the area of the offshore wind farm sites and the offshore cable corridor

and restricted to the immediate vicinity of the cables (i.e. within metres). In addition, EMFs are expected to attenuate rapidly in both horizontal and vertical plains with distance from the source.

On this basis of the above, the Applicant considered it highly unlikely that changes to prey resources would occur over the entire wind farm area and cable route.

The Applicant predicted 0.1% of the North Sea MU reference population could be at increased risk based on the worst-case scenario of all harbour porpoise within the wind farm area being impacted during construction and operation. This is precautionary as during construction harbour porpoise are predicted to be displaced by the impacts from construction noise as opposed to changes in prey availability [APP-336].

On this basis the Applicant concluded that changes to prey resources from the Project alone would not have an adverse effect on integrity on the harbour porpoise of the SNS SAC. This conclusion was not disputed by any Interested Party.

Neither NE nor the ExA commented specifically on the effects of changes to prey resource. However, in its SoCG with the Applicant, NE agreed that there would be no adverse effect on the integrity of the SNS SAC as a result of the Project alone [REP9-046].

On this basis, the Secretary of State concludes that an adverse effect on the integrity of the SNS SAC from changes to harbour porpoise prey resource as a result of the Project alone can be excluded.

5.14.1.5 Changes to water quality

The risk of accidental release of contaminants (e.g. through spillage) will be mitigated through appropriate contingency planning and remediation measures for the control of pollution. The Applicant has stated that it is committed to the use of best practice techniques and due diligence regarding the potential for pollution throughout all construction, operation, maintenance and decommissioning activities. A draft Project Environmental Management Plan ("PEMP") submitted during the Examination includes mitigation measures to reduce the risk of any accidental spills or release of contaminants, this is secured in Condition 14(1)(d) of the Generation dMLs (Schedules 9 and 10 of the DCO) and Condition 9(1)(d) of the Transmission dMLs (Schedules 11 and 12 of the DCO). In addition, a Marine Pollution Contingency Plan ("MPCP") will be developed and agreed post-consent, and is secured within Condition 14(1)(d)(i) of the Generation DMLs (Schedules 9 and 10 of the DCO) and Condition 9(1)(d)(i) of the Transmission dMLs (Schedules 11 and 12 of the DCO).

Disturbance of seabed sediments during construction has the potential to release any sediment-bound contaminants, such as heavy metals and hydrocarbons that may be present within them into the water column. However, data from the site-specific surveys undertaken in 2016 indicates that levels of contaminants within NV East, NV West and the offshore cable corridor are very low. Two of the 13 locations sampled exceeded Cefas Action Level 1 for concentrations. These were for arsenic and only marginally exceeded the Action Level 1 concentration. All organotin and PCB results were below the limits of detection (0.004 mg/kg and 0.0001 mg/kg respectively).

There is the potential for increased suspended sediments as a result of construction activities, such as installation of foundations (for wind turbines, accommodation and electrical substation platforms), cable installation and during any levelling or dredging activities. However, modelling indicates that the majority of the sediment released during seabed preparation would be coarse and would fall within minutes/tens of minutes) to the seabed as a highly turbid dynamic plume immediately upon its discharge (within tens of metres along the axis of tidal flow).

The small proportion of fine sand/mud would stay in suspension for longer and form a passive plume. This plume (tens of mg/l) is likely to exist for around half a tidal cycle. Sediment would settle to the seabed

within a few hundred metres up to around a kilometre along the axis of tidal flow, within a short period of time (hours).

Within the passive plume, suspended solids concentrations were predicted to be within the range of natural variability. Suspended solids concentrations rapidly return to background levels after cessation of the release into the water column. The deposits across the wider seabed would be very thin (millimetres) and would occur within the Project area.

On this basis of the above, the Applicant considered it highly unlikely that changes to water quality would occur over the entire wind farm area and cable route. The maximum number of harbour porpoise that could be affected as a result of changes to water quality during construction and operation was estimated to be the number of animals that could be present in the wind farm area and the cable route which equates to 0.3% of the North Sea MU. On this basis the Applicant concluded that changes to water quality from the Project alone would not have an adverse effect on integrity on the harbour porpoise of the SNS SAC. This conclusion was not disputed by any Interested Party.

Neither NE nor the ExA commented specifically on the effects of changes to prey resource. However, in its SoCG with the Applicant, NE agreed that there would be no adverse effect on the integrity of the SNS SAC as a result of the Project alone [REP9-046].

On this basis, the Secretary of State is satisfied that the potential for pollution has been sufficiently reduced. On this basis, the Secretary of State concludes that an adverse effect on the integrity of the SNS SAC from the effects of changes to water quality as a result of the Project alone upon the harbour porpoise feature can be excluded.

5.14.2 Harbour Porpoise: In-combination

The in-combination assessment considered plans or projects where the predicted effects had the potential to interact with effects from the proposed construction, operation and maintenance or decommissioning of the Project.

5.14.2.1 Auditory injury

No other activities were identified that could lead to auditory injury and, as such, the Applicant concluded that Project would not contribute to an in-combination effect. This conclusion was not disputed by any Interested Party.

Neither NE nor the ExA commented specifically on the effects of in-combination auditory injury. However, in its SoCG with the Applicant, all matters were listed as agreed in relation to the SNS SAC [REP9-046].

On this basis, the Secretary of State concludes that an adverse effect on the integrity of the SNS SAC resulting from effects of potential auditory injury from the Project in-combination with other plans or projects to the harbour porpoise feature can be excluded.

5.14.2.2 Disturbance from underwater noise

The assessment determined a high level of uncertainty in relation to the in-combination scenarios that will arise by the time of the Project construction. The approach taken was therefore based on a range of indicative scenarios for in-combination piling activity, seismic surveys, vessels, seabed preparation, ploughing/jetting/pre-trenching or cutting for installation of cables and rock dumping for protection of the cable, and offshore wind farm operation and maintenance activities.

Of the activities assessed, piling had the biggest impact. Through comparing potential construction schedules, the Applicant estimated that a worst-case scenario would involve the Project piling at the

same time as four other UK offshore wind farm projects (Creyke Beck B, Sofia, Hornsea Project Three And East Anglia TWO). Together, these wind farms have the potential to disturb up to 17,667 harbour porpoise which equates to 5.1% of the North Sea MU reference population. Using NE's spatial approach, it was calculated that disturbance from in-combination piling has the potential to overlap with up to 36.17% and 27.06% of the winter and summer areas, respectively. Average disturbance across a season could overlap with up to 22% and 18% of the winter and summer areas, respectively.

Table 2 taken from of the Applicant's HRAR sums other activities at the other UK offshore wind farm projects identified in the assessment together with piling[93].

Table 2: Quantified in-combination disturbance effect on harbour porpoise

Potential noise sources during piling at Norfolk Vanguard	Potential number of harbour porpoise disturbed (% of reference population)	Area in summer cSAC area (km^2) (percentage of seasonal area)	Area in winter cSAC area (km^2) (percentage of seasonal area)	Seasonal average for summer cSAC area	Seasonal average for winter cSAC area
Piling at OWF projects, based on potential worst-case scenario of OWF projects that could be piling at the same time (Dogger Bank Teesside B (now Sofia), Dogger Bank Creyke Beck B, Hornsea Project Three, East Anglia TWO and Norfolk Vanguard West) for single pile installation at each site and average overlap with cSAC seasonal area (Table 8.34; Table 8.35 and Table 8.36)	8,833 (3%)	4,268km^2 (16%)	2,593km^2 (19%)	15%	16%
OWF construction activities, based on OWFs that are not piling but potential for other construction activities during piling at Norfolk Vanguard (Table 8.41; Table 8.42and Table 8.43) and 100% disturbance	1,925 (0.6%)	1,567km^2 (6%)	482km^2 (4%)	6%	4%
OWF operation and maintenance, based on constructed OWFs that could have O&M activities during piling at Norfolk Vanguard (**Table 8.44**; **Table 8.45** and **Table 8.46**) and 100% disturbance	1,495 (0.4%)	52km^2 (0.2%)	482km^2 (4%)	0.2%	4%
Sub-total (without UXO clearance and seismic surveys)	***12,253 (4%)***	***5,887km^2 (22%)***	***3,557km^2 (27%)***	***21%***	***24%***
UXO clearance, based on up two locations, one in each cSAC seasonal area (**Table 8.37** and **Table 8.38**)	2,210 (0.6%)	2,124km^2 (8%)	2,124km^2 (16%)	0.9%	2%
Seismic surveys, based on up two locations, one in each cSAC seasonal area (**Table 8.39** and **Table 8.40**)	326 (0.09%)	324km^2 (1%)	324km^2 (2%)	0.07%	0.1%
Total	**14,789 (4%)**	**8,335km^2 (31%)**	**6,005km2 (45%)**	**22%**	**26%**

Whilst the Applicant considered the worst-case scenario to be highly unlikely, it was proposed that a SNS SIP should be produced to set out the approach to deliver any mitigation or management measures to reduce piling disturbance from the in-combination effects of underwater noise with other plans or projects during the construction period. Construction would not be allowed to commence until the MMO is satisfied that the SIP provides the necessary mitigation. An In Principle SNS SIP was provided [APP-041] and is secured through Condition 14(1)(m) of the Generation Asset dMLs (Schedules 9 and 10) and Condition and 9(1)(l) of the Transmission dMLs (Schedules 11 and 12) of the DCO.

NE recognised that the worst-case scenario assessed by the Applicant is unrealistic, but that it does remain probable that two or more projects may wish to undertake noisy activities at the same time [REP9-046]. It agreed [REP1-049] that the draft SIP provided an appropriate framework to agree mitigation measures and that the scope of the measures within the In Principle SIP [APP-041] were appropriate, although it noted that as there has not yet been a need to adopt these measures, they have not been proven to be deliverable [REP1-088]. It also considered [RR-106][REP2-036][REP9-046] there remained a lack of clarity on how SIP conditions would ensure that mitigation would be put in place to prevent exceedance of the SNCB thresholds for disturbance and that a mechanism would need to be developed

[93] It is noted that absolute worst-case figures provided have not been used.

by regulators to ensure continuing adherence to the SNCB thresholds as multiple SIPs are developed over time.

The MMO considered a SIP could be used to demonstrate how in-combination underwater noise impacts would be mitigated to ensure that it would not cause an adverse effect [REP1-084][REP4-059]. However, it stressed that this would require accurate project timetables and noted that there is currently no mechanism in place for a regulator to control the scheduling of piling operations [REP1-084].

The MMO also explained [REP4-059] that it has enforcement powers to issue a stop notice or to vary, suspend or revoke a licence. It envisages that construction plans would be assessed by the Applicant in-combination with other projects to ensure there would be no breach of proposed thresholds prior to submission to the MMO. It advised [REP6- 030 and REP7-071] that if the consent decision occurs prior to a mechanism being defined, it could vary the dML; however, the current SIP requirement is likely to be sufficient to allow any mechanism to be fully incorporated without need for variation.

The MMO [REP8-102] confirmed it believes the condition provides the best mechanism at this time to protect impedance of the conservation objectives.

The WDC and TWT agreed with the principle of a SIP but did not consider the In Principle SNS SIP [APP-041] contained enough information to give certainty of no adverse effect on integrity beyond reasonable scientific doubt. TWT [REP1-123] advised that more evidence is required to detail how effective the mitigation outlined in the In Principle SNS SIP would be, and that noise modelling should be undertaken to demonstrate the degree of noise reduction which could be achieved through mitigation. It expressed concerns that there are no mechanisms in place to ensure regulation and compliance of the SIP; that monitoring to understand the effectiveness of mitigation to be delivered through the SIP was not adequate; and that UXO clearance should be included in the dMLs and the SIP conditions due to a lack of baseline data on the number and location of UXO clearances [REP8-110].

The Applicant stated that the In Principle SIP format follows that agreed for other consented projects and is based on information currently available, however it confirmed that the final SIP would be updated based on the final design and taking into account best scientific evidence at the time [REP1-004][REP2-003][REP2-004][REP7-058].

It noted that the BEIS Review of Consents draft HRA (which has since been published)[94] identified a SIP as the most appropriate mechanism to manage the mitigation of potential adverse effect on integrity of the SNS SAC and provided an explanation of the options to manage in-combination effects and mitigation for harbour porpoise [REP4-038][REP4-040]. It provided an updated SNS SIP [REP9-026] at Deadline 9 to take into account comments received from NE and the MMO.

By the close of Examination, NE and the Applicant agreed the draft SNS SIP provides an appropriate framework to agree mitigation measures for effects on the SNS SAC with SNCBs and the MMO prior to construction [REP9-046]. They also agreed that a strategic management mechanism is required from the Regulator and that the current requirement for a SIP is sufficient to allow any mechanism to ensure disturbance can be limited to an acceptable level to be fully incorporated without need for a variation. However, NE advised that an adverse effect on integrity from in-combination impacts cannot be ruled out until this mechanism is in place [REP8-104].

In the ExA's recommendation, it was noted that at the close of Examination, a number of matters described above remained unresolved. In particular, the residual concerns from WDC and TWT over the

94 https://www.gov.uk/government/publications/review-of-consented-offshore-wind-farms-in-the-southern-north-sea-harbour-porpoise-special-area-of-conservation

effectiveness of the Applicant's proposed mitigation. Nevertheless, the ExA were satisfied that through the MMMP and SNS SIP, the Applicant will use the most appropriate measures for the Project based on best knowledge, evidence and proven available technology at the time of construction. The ExA accepted that the SIP cannot be finalised until project design is determined but the ExA considered there to be sufficient detail on potential mitigation measures at this stage, whilst granting the Applicant a flexible approach until the extent and nature of mitigation becomes clear.

The ExA considered that as the final project design evolves, it is likely that better scientific evidence may become available to influence later activities in a positive sense. It also includes a mechanism whereby should new scientific information indicate an outcome beyond that which was assessed in the AA, there should be a review of the position and potentially changes made to the Project.

On this basis, the ExA was satisfied that there would not be an adverse effect on integrity as a result of disturbance from in-combination piling event.

The ExA's recommendation also included a change to the DCO that had not been discussed during Examination with regard to the use of vibro-piling or 'blue-hammer' technology. In response to a request for information, the Applicant proposed alternative text that refer to all piled foundations irrespective of the technology used to install them[95]. The Secretary of State is content that the text proposed by the Applicant captures all possible installation scenarios involving piling.

The Secretary of State has considered the representations made by the Applicant, NE, WDC and TWT, and the recommendation as made by the ExA. The Secretary of State is satisfied that through the SNS SIP, the Applicant will use the most appropriate measures for the Project based on best knowledge, evidence and proven available technology at the time of construction. On this basis the Secretary of State is content to agree with the recommendation as made by the ExA and concludes that an adverse effect on the integrity of the SNS SAC from the effects of underwater noise disturbance to harbour porpoise from the Project in-combination with other plans or projects can be excluded.

5.14.2.3 Vessel Collision (disturbance and collision)

The Applicant's assessment of the number of harbour porpoise that could be at increased collision risk with vessels was based on the number of animals that could be present in the wind farm areas taking into account 95% avoidance rates.

This determined that the number of harbour porpoise that could have a potential increased collision risk with vessels in offshore wind farm sites in the North Sea MU during construction would be 214 individuals, which represents 0.06% of the North Sea MU reference population.

The Applicant's HRAR states that under these circumstances, there is no anticipated adverse effect on the integrity of the SNS SAC in relation to the conservation objectives for harbour porpoise.

This conclusion was not disputed by any Interested Party.

As for the alone assessment, neither NE nor the ExA commented specifically on the effects of in-combination vessel collision. However, in its SoCG with the Applicant, all matters were listed as agreed in relation to the SNS SAC [REP9-046].

[95] Vattenfall (2020b). *Norfolk Vanguard Offshore Wind Farm applicant's response to request for information Department for Business, Energy and Industrial Strategy (BEIS) Request for information.* Document Reference ExA; WQ; 11.D10.1. 28 February 2020.

On this basis, the Secretary of State concludes that an adverse effect on the integrity of the SNS SAC from the effects of vessel interaction with harbour porpoise as a result of the Project in combination with other plans or projects can be excluded.

5.14.2.4 Changes to Water Quality

Following a request for information the Applicant assessed the impacts on water quality to be highly localised and therefore there was no potential for any in-combination effects and no in-combination impact pathways were identified.

The Applicant confirmed that the risk of accidental release of contaminants (e.g., through spillage) will be mitigated through appropriate contingency planning and remediation measures for the control of pollution. A draft Project Environmental Management Plan ("PEMP") has been submitted with the DCO application. This includes the appropriate mitigation measures to reduce the risk of any accidental spills or release of contaminants. In addition, a Marine Pollution indicates that the Contingency Plan ("MPCP") will be developed and agreed post-consent.

As for the alone assessment, neither NE nor the ExA commented specifically on the effects of in-combination changes to water quality. However, in its SoCG with the Applicant, all matters were listed as agreed in relation to the SNS SAC [REP9-046].

On this basis, the Secretary of State concludes that an adverse effect on the integrity of the SNS SAC as a result of changes in water quality from the Project in-combination with other plans or projects can be excluded.

5.14.2.5 Changes to Prey Resource

The Applicant's in-combination assessment on potential changes to prey availability has assumed that any potential effects on harbour porpoise prey species from underwater noise, including piling, would be the same or less than those for harbour porpoise as assessed for in-combination disturbance. Therefore, there would be no additional effects other than those assessed harbour porpoise, i.e., if prey are disturbed from an area as a result of underwater noise, harbour porpoise will be disturbed from the same or greater area, therefore any changes to prey availability would not affect harbour porpoise as they would already be disturbed from the same area.

In the Applicant's view, effects on prey species are likely to be intermittent, temporary, and highly localised, with potential for recovery following cessation of the disturbance activity.

The Applicant considered that any permanent loss or changes of prey habitat will typically represent a small percentage of the potential habitat in the surrounding area. Consequently, the Applicant determined that there would be no adverse effect on integrity of the SNS SAC in relation to the conservation objectives for harbour porpoise arising from changes in prey resources.

This conclusion was not disputed by any Interested Party.

As for the alone assessment, neither NE nor the ExA commented specifically on the effects of in-combination changes to prey resource. However, in its SoCG with the Applicant, all matters were listed as agreed in relation to the SNS SAC [REP9-046].

On this basis, the Secretary of State concludes that an adverse effect on the integrity of the SNS SAC from changes to harbour porpoise prey resource as a result of the Project in-combination with other plans or projects can be excluded.

5.15 Appropriate Assessment: The Wash and North Norfolk Coast SAC

The Wash and North Norfolk Coast SAC covers an area of approximately 107,800 ha and is located approximately 80 km from the Project. 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 Wash and North Norfolk Coast SAC supports the following qualifying features:

- Atlantic salt meadows;
- Coastal lagoons;
- Harbour (common) seal;
- Large shallow inlets and bays;
- Mediterranean and thermo-Atlantic halophilous scrubs;
- Mudflats and sandflats not covered by seawater at low tide;
- Otter;
- Reefs;
- *Salicornia* and other annuals colonising mud and sand; and
- Sandbanks which are slightly covered by sea water all the time.

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 of the Wash and North Norfolk Coast SAC due to the potential for disturbance to occur at haul out sites and at sea foraging grounds. A LSE was also identified due to the risk of collision at sea with increased vessel traffic, alone and in-combination with other plans or projects.

5.15.1 Harbour Seal Disturbance: Alone

5.15.1.1 Disturbance at Haul Out Sites

The Applicant's HRAR [APP-045] assessed the potential effect of vessels at haul out sites. It concluded that vessels would be highly unlikely to be within 300 m of the coast, in areas of close proximity to the seal haul-out sites within The Wash and North Norfolk Coast SAC. On this basis the Applicant concluded that there would be no potential for adverse effect on integrity from the Project alone. NE agreed with the Applicant's conclusion of no adverse effect on the integrity of The Wash and North Norfolk Coast SAC as a result of the Project alone [REP1-088].

The Secretary of State is content that the risk of disturbance at haul sites is low and concludes that an adverse effect on the integrity of the Wash and North Norfolk Coast SAC from the effects of disturbance at harbour seal haul out sites as a result of the Project alone can be excluded.

5.15.1.2 At Sea Disturbance

The Applicant's HRAR provided an estimate for the number of seals temporary disturbed in the array and cable corridor by activities occurring during the construction and operation of the Project. The maximum number[96] of harbour seals temporary disturbed was 0.2 in the wind farm area and 24 in the corridor.

[96] The maximum figure referred here does not include UXO estimates as UXO clearance is subject to separate licencing.

Assuming all seals were from The Wash and North Norfolk Coast, the Applicant calculated this would equate to 6.3% of the SAC population.

The Wash and North Norfolk Coast SAC is located 82 km from the Project site and 33 km from the offshore cable corridor (at closest point). On this basis the Applicant considered that it would be highly unlikely, especially taking into account the movements of tagged seals, that all seals in the offshore development area are from The Wash and North Norfolk Coast SAC.

This position was not disputed by any Interested Party. NE agreed with the Applicant's conclusion of no adverse effect on the integrity of The Wash and North Norfolk Coast SAC as a result of the Project alone [REP1-088].

The Secretary of State has reviewed the worst-case figures presented and notes the low likelihood of all harbour seals originating from the SAC. On this basis the Secretary of State concludes that an adverse effect on the integrity of the Wash and North Norfolk Coast SAC due to harbour seal disturbance from the Project alone can be excluded.

5.15.1.3 Harbour Seal Collision

The Applicant's HRAR provided approximate figures for the number of vessel movements expected from the Project's construction (operational movements are unlikely to be near The Wash and North Norfolk Coast SAC given the expected operation and maintenance ports are in East Anglia); 1,180 vessel movements over the two to four year indicative offshore construction window, with an average of approximately two vessel movements per day. However, the Applicant expected that seals would be able to detect the presence of vessels and, given that they are highly mobile, would be able to largely avoid vessel collision. This conclusion was not disputed by any Interested Party. NE agreed with the Applicant's conclusion of no adverse effect on the integrity of The Wash and North Norfolk Coast SAC as a result of the Project alone [REP1-088].

On this basis, the Secretary of State concludes that an adverse effect on the integrity of the Wash and North Norfolk Coast SAC due to collision risk to harbour seal from the Project alone can be excluded.

5.15.2 Harbour Seal Disturbance: In-combination

5.15.2.1 Disturbance at Haul Out Sites

The Applicant's HRAR [APP-045] assessed the potential effect of vessels at haul out sites. It concluded that vessels would be highly unlikely to be within 300 m of the coast, in areas of close proximity to the seal haul-out sites within The Wash and North Norfolk Coast SAC. On this basis the Applicant concluded that there would be no potential for an adverse effect on site integrity in-combination with other plans or projects. NE agreed with the Applicant's conclusion of no adverse effect on the integrity of The Wash and North Norfolk Coast SAC as a result of the Project in combination with other plans or projects [REP1-088].

The Secretary of State is content that the risk of disturbance at haul sites is low and concludes that an adverse effect on the integrity of the Wash and North Norfolk Coast SAC from the effects of disturbance at harbour seal haul out sites as a result of the Project in-combination with other plans and projects can be excluded.

5.15.2.2 At Sea Disturbance

The Applicant's HRAR provided an estimate for the number of seals temporary disturbed from the Project in-combination with other plans or projects by activities occurring during the construction and operation

phases. The maximum number of harbour seals temporary disturbed was 209[97]. Assuming all seals were from The Wash and North Norfolk Coast, the Applicant calculated this would equate to 6% of the SAC population.

However, the Applicant considered that given the wide range of plan/project locations over the Southern North Sea area used in this in combination assessment it is highly unlikely that all disturbed seals would be from The Wash and North Norfolk Coast SAC. Furthermore, given the distance between the projects offshore and their distance from the coast, it is not anticipated that foraging harbour seal would be significantly displaced from foraging areas or moving between haul-out sites and foraging areas. On this basis the Applicant considered that there would not be an adverse effect on the integrity of The Wash and North Norfolk Coast SAC. This position was not disputed by any Interested Party. NE agreed with the Applicant's conclusion of no adverse effect on the integrity of The Wash and North Norfolk Coast SAC as a result of the Project in combination with other plans or projects [REP1-088].

The Secretary of State has reviewed the worst-case figures presented and has noted the low likelihood of all seals originating from the SAC. On this basis the Secretary of State concludes that an adverse effect on the integrity of the Wash and North Norfolk Coast SAC due to harbour seal disturbance from the Project in-combination with other plans or projects can be excluded.

5.15.2.3 Harbour Seal Collision

The Applicant's HRAR provided approximate figures for the number of vessel movements expected from the Project's construction (operational movements are unlikely to be near The Wash and North Norfolk Coast SAC given the expected operation and maintenance ports are in East Anglia); 1,180 vessel movements over the two to four year indicative offshore construction window, with an average of approximately two vessel movements per day. However, the Applicant expected that seals would be able to detect the presence of vessels and, given that they are highly mobile, would be able to largely avoid vessel collision. This conclusion was not disputed by any Interested Party. NE agreed with the Applicant's conclusion of no adverse effect on the integrity of The Wash and North Norfolk Coast SAC as a result of the Project in combination with other plans or projects [REP1-088].

The Secretary of State concludes that an adverse effect on the integrity of the Wash and North Norfolk Coast SAC due to collision risk to harbour seal from the Project in-combination with other plans or projects can be excluded.

[97] Note this figure includes UXO clearances and seismic surveys which are subject to separate licencing.

6 Habitats Regulations Assessment Overall Conclusions

The Secretary of State has carefully considered the information presented, 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 a likely significant effect on 19 protected sites when considered alone and in-combination with other plans or projects. These sites are listed below:

- Alde-Ore Estuary SPA and Ramsar site
- Breydon Water SPA and Ramsar site
- Broadland SPA and Ramsar site
- Flamborough and Filey Coast SPA
- Greater Wash SPA
- North Norfolk Coast SPA and Ramsar site
- Outer Thames Estuary SPA
- Haisborough, Hammond and Winterton SAC
- Humber Estuary SAC
- Norfolk Valley Fens SAC
- Paston Great Barn SAC
- River Wensum SAC
- The Broads SAC
- Southern North Sea SAC
- The Wash and North Norfolk Coast SAC

The Secretary of State has undertaken an Appropriate Assessment in respect of the conservation objectives of these 19 protected sites to determine whether the Project, either alone or in-combination with other plans or projects, will result in an adverse effect on their integrity.

The Secretary of State has considered the available information and the mitigation measures secured through the DCO and dMLs, and has concluded that the Project will not have an adverse effect on the integrity of any of the following sites:

- Breydon Water SPA and Ramsar site
- Broadland SPA and Ramsar site
- Greater Wash SPA
- North Norfolk Coast SPA and Ramsar site
- Outer Thames Estuary SPA
- Humber Estuary SAC
- Norfolk Valley Fens SAC
- Paston Great Barn SAC
- River Wensum SAC
- The Broads SAC
- 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:

- Impacts on the lesser black-backed gull feature of the Alde-Ore Estuary SPA/ Ramsar, from the Project in-combination with other projects.
- Impacts on the kittiwake feature of the Flamborough and Filey Coast SPA, from the Project in-combination with other projects.
- Impacts on the Annex 1 sandbank and reef features of the Haisborough, Hammond and Winterton SAC from the Project alone and in combination with other projects.

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 on whether sufficient information on the further tests set out in the Habitats Regulations to allow a decision to be made are presented in Sections 9 to 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.

Under Regulation 24 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009, the ExA (on behalf of the Secretary of State) undertook two screenings. The first screening was undertaken on 16 February 2017 [OD-002]. It was concluded that significant effects on the environment of European Economic Area states were likely. A notice was placed in the London Gazette on 22 February 2017 and the following states were notified:

- Belgium;
- Denmark;
- France;
- Ireland;
- The Netherlands;
- Norway.

Belgium, Denmark, France, Germany and the Netherlands responded, requesting to be involved in further consultation in relation to the Project. Norway responded requesting to be kept informed of studies regarding birds but did not wish to participate in the consultation process. No response was received from Ireland.

Following the acceptance of the application for Examination, the second screening was undertaken on 8 August 2018. Consultation letters were sent to the states which had previously requested further involvement, offering the opportunity for them to register as Interested Parties. No additional states were identified as being likely to have significant effects on their environment.

France responded by noting the potential for impacts on marine mammals from noise during construction and barrier effects on birds [OD-010]. Specific concerns raised by France related to impacts on qualifying features of the Bancs des Flandres and the Cap Gris-Nez SPAs. Furthermore, it requested the cumulative effects assessment be undertaken taking into account French wind farms; that ornithological monitoring be undertaken; and that the Applicant should implement mitigation techniques including clamping of turbines during heavy flows [REP1-074]. The Applicant responded to the concerns raised by the French Ministry in [REP1-007 and REP2-003] and submitted screening matrices for the Bancs des Flandres and Cap Gris-Nez SPAs [AS-044]. It noted that many of the named species at both Caps Griz-Nez and Bancs des Flandres SPAs have not been recorded on the Project site and are not ones associated with offshore locations. With respect to species named as non-breeding features of the SPA, these consist of many of the seabird species which pass through the southern North Sea and English Channel on migration.

Given the relative size of the SPA population estimates for the migratory species compared with the total passage populations, the Applicant stated that effects on the SPA populations due to the Project would be negligible. Furthermore, the Applicant stated that due to the distances of the aforementioned sites from the Project (175 km and 210 km respectively) and the species concerned, that the potential for connectivity is very small. The Applicant considered that cumulative impacts had been thoroughly

assessed and confirmed that it had committed to monitoring seabirds through an Ornithological Monitoring Plan. The Applicant concluded that likely significant effects can be ruled out.

In its 'Rule 17' Request for Further Information [PD-018] the ExA asked the French Government to provide any comments it wished to make in relation to the updated screening matrices [AS-044] for any of the Natura 2000 sites located in France. However, by the close of the Examination no further such responses had been received from the French Government.

The Netherlands requested that in-combination impacts on birds from future wind farms which are licensed and approved by official Government Policy should be included [OD-013]. Norway and Denmark had no additional comments.

Potential transboundary impacts were considered in the ES Transboundary Impacts Screening [APP-356] with relevant matters carried forward to the individual topic chapters of the ES.

The Secretary of State notes that the Applicant considered non-UK protected sites in its Application and it concluded that there would be no likely significant effect from the Project alone or in-combination for all non-UK protected sites. 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 for the Project both alone and in-combination with other projects on the sandbank and reef features of the Haisborough, Hammond and Winterton SAC.

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 ("AEOI").

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)[98] and Defra (2021)[99], 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.

[98] The Planning Inspectorate (2017): *Advice Note Ten: Habitats Regulations Assessment Relevant to Nationally Significant Infrastructure Projects.*

[99] 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 Project Objectives

The Applicant outlines a series of objectives for the Project, which include those that define the strategic function of the Project within the UK energy strategy and others that have been adopted to influence certain aspects of the design of the development or reflect the geographical constraints available to the Applicant.

The objectives for the Project were listed in the Applicant's Provision of Evidence. In summary they were:

a) To contribute to enhancing the security of the UK's energy supply by providing UK-produced renewable energy as required by National Policy Statement ("NPS") EN-1;
b) To provide low-cost energy to the UK consumer. The Project site is stated to have been selected because its ground conditions and high wind resource would make delivery efficient. Offshore wind is also stated to be one of the most cost-effective and easy-to-deploy sources of energy within the UK;
c) To contribute to the UK's drive to meeting carbon reduction commitments;
d) To contribute to the Offshore Wind Sector Deal and the Government's targets to reach 30GW and 40GW respectively of installed offshore wind capacity by 2030;
e) To contribute to the UK's industrial strategy and global leadership in the development of offshore wind projects resulting in socio-economic benefits at a UK and East Anglia/Norfolk level; and
f) To help to create a positive legacy for Norfolk and East Anglia facilitating socio-economic development.

Having regard to the suite of objectives identified by the Applicant in the context of National Policy Statements on energy (EN-1)[100], renewable energy infrastructure (EN-3)[101] and electricity networks infrastructure (EN-5)[102], 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; and
- 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 licensing of

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

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

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

leases by The Crown Estate for areas of the seabed to be developed, and the purchase of low carbon electricity through Contracts for Difference[103].

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 the developer and investors and allow the developer to fulfil the terms of its lease with The Crown Estate. This is captured by a third objective:

- To maximise generation and export capacity within the constraints of the available sites and onshore transmission infrastructure.

Furthermore, given that the development of offshore wind is driven by the need to limit the magnitude and impacts of climate change, and that the earlier that steps towards decarbonisation are introduced the greater will be their contribution to limiting climate change, the Secretary of State considers that a key objective of the Project is to be operational at the earliest date. This is captured by the Applicant's Objective 3:

- Contribute to the UK's drive to meeting carbon reduction commitments.

In conclusion, it is considered that the benefits from the Project to the UK society and/or to the developer could alternatively be provided by any project with the following objectives:

- To generate low carbon electricity from an offshore wind farm in support of the decarbonisation of the UK electricity supply;
- To export electricity to the UK National Grid to support UK commitments for offshore wind generation and security of supply;
- To optimise generation and export capacity within the constraints of available sites and onshore transmission infrastructure; and
- Contribute to the UK's drive to meeting carbon reduction commitments.

9.2 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.

[103] https://www.gov.uk/government/collections/electricity-market-reform-contracts-for-difference.

9.3 Consideration of Alternatives

9.3.1 Do Nothing

Not proceeding with the Project would remove the risk of direct impacts to ornithology and benthic features but would not meet the Project's objectives and would hinder the wider need to deploy offshore wind generation at scale, before 2030, to help the UK to meet its commitments under the Climate Change Act 2008 (as amended) to mitigate the effects of climate change.

The benefits from the Project are established by the Applicant in its Provision of Evidence. In summary, the key drivers underpinning the urgent need for renewable energy, within the UK are:

- The need for energy security, including:
  - The need to secure safe, affordable, reliable energy, preferably generated in the UK for the UK market;
  - The need to replace existing ageing energy generation infrastructure;
  - The need to meet expected electricity demand whilst meeting climate change commitments; and
  - The need to reduce greenhouse gas emissions by increasing energy generation from low carbon sources, replacing high carbon energy sources such as coal and gas.

Once constructed, the Project would be one of the largest offshore wind projects in the world and would make a significant contribution to the achievement of both the national renewable energy targets and to the UK's contribution to global efforts to reduce the effects of climate change.

The Do Nothing alternative would erode the capacity anticipated to be operational by 2030, putting additional reliance on as-yet unidentified projects to meet the Government's ambitions for 40GW offshore wind by 2030.

9.3.2 Offshore Wind Farms Not in the UK EEZ

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

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.

9.3.3 UK Alternative sites outside existing Leasing Round Areas

Any location which has not yet commenced a site selection exercise would not meet the Applicant's Objective 4, due to the long lead in times for site selection, EIA, consenting, detailed design, procurement, consent compliance, and construction of the offshore wind farm. The lead in time for offshore wind farms is typically over 10 years from the start of the process, through to lease award, consenting, construction and commissioning. Therefore, an alternative UK site outside an existing leasing round area would not contribute to the 2030 40GW target in response to the urgent need for renewable energy.

9.3.4 UK Alternative sites within Existing Lease Areas

9.3.4.1 Repowering existing offshore wind farms

Typically, offshore wind farms have a life span of 20 to 25 years before planned decommissioning. Most operational wind farms will not reach their decommissioning stage for another decade.

Round 1 and 2 sites are also significantly smaller in capacity (<0.7GW) than the Project. Therefore, a much greater number of offshore wind farms would have to be repowered to address the urgent need for large scale projects required to meet the Government's climate change targets. Further, many currently operational offshore wind farms are expected to be repowered and, as such, repowering existing offshore wind farms is not considered to be an alternative solution to the Project.

9.3.4.2 Scottish Territorial Waters offshore wind farms

The Crown Estate Scotland offered exclusivity agreements to a number of offshore wind farms in Scottish Territorial Waters in 2009. These sites have their own project objectives and form a critical component in satisfying the need for renewable energy. In January 2022, the Crown Estate Scotland also announced the applicants who had been offered option agreements for sites in Scotland under Scotwind[104]. Scottish sites are therefore not considered to be alternative solutions.

9.3.4.3 Round 2

The Docking Shoal and London Array II offshore wind farms were not taken forward and could be considered to represent potential alternatives. However, the reasons for why these sites were discounted are likely to still apply. Data collected during their development would be out of date and the consenting process would need to be restarted.

9.3.4.4 Round 1 and 2 Extensions

The Crown Estate allowed extensions to Round 1 and 2 offshore wind farms by up to 2GW in 2010. Galloper Wind Farm, Kentish Flats Extension, Burbo Bank Extension and the Walney Extension, were all progressed and consented. Galloper has applied for further extension through The Crown Estate process in 2017. However, offshore wind farm extensions are not considered to be alternatives to the Project.

9.3.4.5 Round 3

The consenting of other Round 3 offshore wind farms is not considered to lessen the scale or urgency of the need for further large-scale offshore wind projects. These are therefore not considered to be alternative solutions.

Round 3 sites which have not been taken forward could be considered to represent potential alternatives: Atlantic Array (Bristol Channel Zone), Rhiannon (Irish Sea Zone), Navitus Bay (west of Isle of Wight Zone). However, the Applicant's Objective 6, relating to the socio-economic enhancement in Norfolk and East Anglia), and the Applicant's Objective 4, relating to contributing to the Government's 2030 targets for installed offshore wind capacity would not be met.

[104] https://www.crownestatescotland.com/our-projects/scotwind

9.3.5 Alternative Offshore Cable Corridors

Site selection for the offshore cable corridor was carried out by the Applicant in consultation with The Crown Estate. Possible landfall locations were reviewed within an area from The Wash to Harwich. The majority of the coastline in this area is protected by various designations.

To avoid these designations, the Applicant considered the following potential landfall areas: Mundesley to Sea Palling (including Happisburgh South (the selected option) Gorleston-on-Sea or Lowestoft to Kessingland (Lowestoft area).

In parallel with the identification of landfall options, the Applicant also identified options for provisional offshore cable corridors from NV East and NV West to each of the three landfall options listed above.

The Lowestoft landfall area was considered to be unfeasible due to an additional six cable/pipeline crossing agreements which would be required, additional costs which would not be in accordance with the Applicant's Objective 2 to provide low cost energy to the UK consumer, and the significantly higher volume of cable protection which would be required.

The Gorleston-on-Sea landfall area was not considered feasible due to the highly mobile sandwaves in the area which increase the potential for cables to become exposed, the close proximity to existing and potential aggregate dredging areas, and the onshore cable route would have to be routed through the Broads National Park where the high water content of ground conditions make it unsuitable for cable installation,

With the listed constraints considered, the offshore cable corridor alternatives could not take direct routes from NV East to NV West to the potential landfall areas. The routes were therefore lengthened to avoid constraints.

9.3.6 Alternative Designs

9.3.6.1 Fewer turbines

A reduction in the number of turbines for the Project would reduce seabird collision risk. The Applicant stated that the number of turbines had already been reduced from what had been proposed in the Preliminary Environmental Information Report ("PEIR"). A total of 257 turbines were proposed in the PEIR based on a 7MW turbine. A maximum of 158 turbines are now proposed based on a turbine capacity of 11.55MW.

The design envelope includes the option to further reduce the number of turbines by using larger capacity turbines (11.55MW to 20MW turbines), if new technologies are available prior to construction.

9.3.6.2 Draught height

Following engagement between the Applicant and the supply chain, it is noted that installation vessels currently available on the market can install turbines with a hub height of 145 – 150 m. The installation capacity of vessels currently available is therefore a limiting factor in relation to the maximum draught height increase that can be secured. Based on individual turbine parameters, a hub height of 145 m allows a minimum draught height of 35 m for turbines with a capacity of 11.55 – 14.6 MW, and a hub height of 150 m allows a minimum draught height of 30 m for turbines with a capacity of 14.7 – 20 MW.

The Applicant has committed to further raising draught heights to:

- 35 m (above MHWS) for turbine models of 11.55MW to 14.6 MW capacity; and
- 30 m (above MHWS) for turbine models of 14.7 MW and 20 MW.

The Project is progressing a design which is considered to be at the limit of commercial availability in relation to installation vessel capacity and turbine capacity and must maintain flexibility as the largest vessels at the time of construction cannot be guaranteed. Any further raising of draught height would not be feasible.

9.3.6.3 Seasonal restrictions on turbine operation

For seasonal restrictions on turbine operation to have a material effect on the number of predicted kittiwake collisions from the Flamborough and Filey Coast SPA, shutdown of all the turbines for the Project would need to occur for several months of the year. The Applicant highlighted that shutting down turbine operation during the months where collision risk is highest for kittiwake and lesser black-backed gull would provide a very limited benefit.

The limited benefit on collision mortality would be accompanied by a significant reduction in electricity output, which would significantly reduce the overall capacity of the Project. This would affect the Project's ability contribute to the 2030 renewable energy target. It would also reduce its cost efficiency, affecting its ability to provide low-cost energy to the UK consumer in line with the requirements of the Contracts for Difference process.

9.3.7 Cable protection

9.3.7.1 Use of marker buoys

The Applicant did not consider the use of marker buoys, at locations where it is not possible to achieve the target depth of cable burial, to be feasible for the following reasons:

- The assessment of risk to the cables, as carried out by insurers and the offshore transmission owner ("OFTO") technical advisors, is based on the degree of physical protection afforded by the completed installation design. Unprotected cables are likely to present an unacceptable level of risk;
- Whilst marker buoys may be effective at reducing the threat of physical damage to cables associated with bottom-trawling activities, they cannot be considered as an equivalent alternative to physical protection measures;
- Marker buoys do not mitigate other types of threat to the cable; and
- Exposed cables also present a potential health and safety risk and the deployment of additional marker buoys would require careful consideration with regards to navigational safety once the location(s) of marker buoys are known.

9.3.7.2 No cable protection within the Haisborough, Hammond and Winterton SAC

The Applicant commissioned an Interim Cable Burial Study which considered the risk of not being able to bury cables. Its conclusions enabled a reduction in the quantity of cable protection within the SAC from 10% to 5% of the cable length.

The Applicant has committed to agreeing the cable installation methodology with the MMO and NE prior to commencement. The Applicant is continuing to work with cable installation specialists to understand the challenges associated with cable burial in the substrate types which are likely to be present in the SAC, and to identify the types of burial method and tools which are most likely to result in successful burial to minimise impacts.

The Applicant considered the option of no cable burial to not be feasible based on the risk of encountering situations where burial at a sufficient depth cannot be achieved to provide adequate protection from risk of damage.

9.4 Conclusion on Alternatives

The Applicant did not submit information on alternatives before or during the Examination. As NE advised that an adverse effect on integrity could not be ruled out for several sites, the Secretary of State requested information on what consideration had been given to alternatives in his letter of 6th December 2019.

Of the Interested Parties which provided comment on alternative solutions presented by the Applicant, these were focussed on the adverse effects on the integrity of the Haisborough, Hammond and Winterton SAC. Natural England advised that the Applicant should consider the use of marker buoys which would remove the need for cable protection and cited the Lincs Offshore Wind Farm as an example of this[105]. The Wildlife Trusts believed the Applicant had not exhausted consideration of viable alternatives and suggested it should explore how no cable protection in the SAC could be achieved as well as a shared cable route with other offshore wind farm developers[106].

Following a review of the information submitted by the Applicant in response to this letter and comments provided by Interested Parties, and having identified the objectives of the Project and considered all alternative means of fulfilling these objectives, the Secretary of State is satisfied that no alternative solutions are available.

[105] Natural England (2020). *Norfolk Vanguard – Applicant's submission to Secretary of State Consultation Request for further information*. 27 April 2020.

[106] The Wildlife Trusts (2020) *Response from The Wildlife Trusts on further information submitted by Norfolk Vanguard to the Secretary of State for Business, Energy and Industrial Strategy*. 27 April 2020.

10 Imperative Reasons of Overriding Public Interest (IROPI)

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[107] and the European Commission[108], 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; the sandbank and reef features of Haisborough Hammond and Winterton SAC; and the lesser black-backed gull feature of Alde-Ore 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.

[107]https://consult.defra.gov.uk/marine-planning-licensing-team/mpa-compensation-guidance-consultation/supporting _documents/mpacompensatorymeasuresbestpracticeguidance.pdf

[108] 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)[109], renewable energy infrastructure (EN-3)[110] and electricity networks (EN-5)[111] 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[112].

The UK has also committed to decarbonise the electricity system by 2035, subject to security of supply, focusing on 'home-grown technologies'[113]. 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 The National Policy Statements (NPSs)

10.1.1 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

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

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

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

[112] www.gov.uk/government/news/end-to-coal-power-brought-forward-to-october-2024

[113] https://www.gov.uk/government/news/plans-unveiled-to-decarbonise-uk-power-system-by-2035

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 that fall within the scope of the NPSs[114]. 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[115].

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)[116] 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[117] that the objective of ensuring the security of the electricity supply constitutes an IROPI.

[114] NPS EN-1 Para 1.1.1

[115] NPS EN-3 Para 1.3.1

[116] http://www.legislation.gov.uk/ukpga/2008/29/contents.

[117] Judgement of 29. 7. 2019 – *Case C-411/17 Inter-Environnement Wallonie and Bond Beter Leefmilieu Vlaanderen.* ECLI:EU:2019;622.

10.1.2 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[118].

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 system[119]. 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[120]. Under some 2050 pathways, electricity generation would need to be virtually emission-free, because emissions from other sectors were expected still to persist[121]. Consequentially, the need to electrify large parts of the industrial and domestic heat and transport sectors could double electricity demand by 2050[122].

The NPSs conclude that the UK needs sufficient electricity capacity from a diverse mix of technologies and fuels[123], 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[124]. 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[125,126]. The economic feasibility of harvesting sufficient available natural resource will be an important driver for proposed locations of renewable energy projects[127].

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[128].

[118] NPS EN-1 Para 2.2.8

[119] NPS EN-1 Para 11.7.2

[120] NPS EN-1 Para 2.2.1

[121] NPS EN-1 Para 2.2.6

[122] NPS EN-1 Para 2.2.22

[123] NPS EN-1 Para 2.2.20

[124] NPS EN-1 Para 3.1.1

[125] NPS EN-1 Para 3.1.3

[126] NPS EN-1 Para 3.1.4

[127] NPS EN-3, Para 2.6.57

[128] NPS EN-3 Para 2.6.1

10.2 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.

10.2.1 Climate Change Act 2008

The Government, through the 2008 Act, set legally binding carbon targets for the UK[129], 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'[130].

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')[131], and UK Clean Growth Strategy[132]. 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.

10.2.2 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 1ºC 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

[129] 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

[130] HM Government. *The UK Low Carbon Transition Plan*. HMSO, 2009. Five Point Plan.

[131] HM Government. *The UK Low Carbon Transition Plan*. HMSO, 2009. Five Point Plan.

[132] BEIS. *The Clean Growth Strategy*. HMG, 2017 (Corrected 2018).

a need for low-carbon infrastructure development which is consistent with the need case set out in NPS EN-1, 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 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')[133]. 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[134], 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[135] 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 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

[133] BEIS. *Offshore wind Sector Deal*. BEIS Policy Paper, 2019.
[134] HM Government, The Queen's Speech 2019 – background briefing notes. https://assets.publishing.

service.gov.uk/government/uploads/system/uploads/ attachment data/file/853886/

Queen_s_Speech_December_2019_-_background_briefing_notes.pdf, 2019 p116

[135] Offshore Wind Operational Report 2020, The Crown Estate, p7,
https://www.thecrownestate.co.uk/media/3792/offshore-wind-operational-report-1.pdf

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.

11 Proposed Compensatory Measures

Following Examination and prior to his decision to grant development consent for the Project, on the 6 December 2019, the Secretary of State requested the Applicant to provide in-principle compensatory measures for the kittiwake feature of the Flamborough and Filey Coast SPA and the lesser black-backed gull feature of the Alde-Ore Estuary SPA[136]. During redetermination of the Project, the Secretary of State also requested details of compensation strategies for the razorbill and guillemot features of the Flamborough and Filey Coast SPA, as well as for the reef and sandbank features of the Haisborough, Hammond and Winterton SAC with consideration of Defra's letter dated February 2021[137].

11.1 Alde-Ore Estuary SPA

The final version of the Applicant's in-principle compensatory measures plan submitted after Examination closed contained the following measures[138]:

- Provision of predator-proof fencing and habitat management to provide a nesting area where mammal predators are excluded; and
- Funding a coordinator to facilitate the organisation of a stakeholder working group which would review the factors affecting the status of the lesser black-backed gull population and proposals for conservation measures.

The Applicant would undertake research to confirm that the current poor breeding success at the colony is linked to mammalian predation and not to other factors and ensure that other measures which could be effective are not overlooked. If necessary, trials of compensation measures would be undertaken to establish effectiveness.

The Applicant identified sites at Orford Ness National Nature Reserve which could be made suitable for nesting lesser black-backed gulls through predator-control. The Applicant suggested that enclosing and area over 4 ha would enhance breeding success at the SPA to an extent that would greatly exceed the loss of 2.6 birds per annum (based on NE's calculation of collision-related mortality) attributed to the Project.

The Applicant proposed a phased approach with the delivery co-ordinator being appointed first and setting up a working group which would be likely to involve the Applicant, NE, the local planning authority, the RSPB and the National Trust (as landowners and managers). A scoping study of potential measures would be undertaken; the working group would then consider which measures would be appropriate and these would be implemented. The costs would be met by the Applicant. It advised that it might not be possible to have all the measures in place before the operation of the Project began but considered that the proposals were likely to over-compensate for any losses. This would outweigh a short-term delay in delivery.

[136] BEIS (2019). *Request for information and notification of the Secretary of State's decision to set a new date for determination of the Application*. 6th December 2019.

[137] Defra (2021). *Defra Letter Ref: 210225.*

[138] MacArthur Green (2020). *Habitats Regulations Derogation, Provision of Evidence – Appendix 2 Alde-Ore Estuary SPA In Principle Compensation Measures for lesser black-backed gull*. 28 February 2020.

The strategy would include monitoring proposals, the results of which would be provided to the Secretary of State, along with any proposals to address effectiveness. Proposals to improve effectiveness of measures would be implemented as approved by the Secretary of State.

The following compensation measures were also considered by the Applicant, but not taken forward:

- Closure of sandeel fisheries to provide improved prey availability. These measures were scoped out because sandeels are not considered to be a major component of the lesser black-backed gull diet and the primary North Sea sandeel fishery areas are not within foraging range of the SPA population; and
- Cessation of culling of lesser black-backed gulls at the SPA. This was scoped out because culling is not currently undertaken at the site.

NE agreed that the proposed measures detailed in the Applicants submission would have the potential to benefit lesser black-backed gulls at the SPA. Its view was that while the funding of a coordinator and scoping study is helpful there must be a commitment to delivering measures on the ground which would offset predicted collision mortality[139].

The RSPB considered the predator control measures proposed to be additional to measures already considered necessary to restore the lesser black-backed gull population. It also thought there was scientific uncertainty as to the effectiveness of the measures and recommended further research to test the most likely measures. It also recommended further consideration be given to compensatory measures outside of the SPA and the establishment of an Expert Working Group to report to the Secretary of State in advance of consent being granted[140].

The Secretary of State considered that the proposed wording of Schedule 17 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.

11.2 Flamborough and Filey Coast SPA

The final version of the Applicant's in-principle compensatory measures plan submitted after Examination proposed the construction of artificial nest sites to increase the productivity of the kittiwake population[141]. The Applicant calculated that an area of wall measuring 30 m by 8 m would accommodate 200 pairs of kittiwake which in turn would produce around five times the 21 birds per annum that would be lost to the SPA colony (based on NE's preferred calculation method). A wall attached to an offshore structure would be closer to foraging grounds than onshore locations and would be likely to support a colony with higher productivity than one at an onshore location.

[139] Natural England (2020). *Norfolk Vanguard – Applicant's submission to Secretary of State Consultation Request for further information*. 27 April 2020.

[140] The Royal Society for the Protection of Birds (2020). *Written Submission for The Royal Society for the Protection of Birds – Response to the Secretary of State's Consultations*. 22 April 2020.

[141] MacArthur Green (2020). *Habitats Regulations Derogation, Provision of Evidence – Appendix 1 Flamborough and Filey Coast Special Protection Area (SPA) – In Principle Compensation Measures for Kittiwake.* 28 February 2020.

The Applicant also considered the potential for reducing the impacts of sandeel fishing. It cited evidence which shows that availability of sandeel as a prey item can have a significant effect on kittiwake breeding success. There is also evidence that fishing activity is affecting the abundance of sandeel in the region. Evidence of kittiwake breeding success following the closure of sandeel fisheries is limited, but the Applicant pointed to an example in Scotland where this had been demonstrated.

The Applicant concluded that there was no UK authority at present with the jurisdiction to deliver fisheries management measures which would allow the closure of sandeel fisheries. The Applicant considered the option of purchasing fishing quota but noted that the quota is currently held entirely by Danish fisheries interests. It concluded that reduction in fishing pressures on sandeel through either mechanism would not be practical.

Predator control was also considered by the Applicant, but this has not been identified as an issue of concern at the SPA. Research by the JNCC on the national seabird population did not identify predation as a major cause of kittiwake decline. The Applicant concluded that predator control at the colony was unlikely to deliver any significant benefits.

While NE agreed that artificial nests could in principle be of benefit to the regional kittiwake population, it felt greater confidence was needed in ensuring there would be a net benefit to the overall population size and not simply a redistribution, and that sufficient food resources within the likely foraging range were available to support productivity[142]. It advised that site selection should be informed by modelled distribution of kittiwake from the Flamborough and Filey Coast SPA and analysis of population trends in East Anglia with those in south east England and the Channel.

The RSPB did not support the Applicant's proposals and stated that the success of artificial nesting structures in increasing the productivity of kittiwake is unproven and would be experimental. Similar to its comments for the lesser black-backed gull feature of the Alde-Ore Estuary SPA, the RSPB recommended the creation of an Expert Working Group to report to the Secretary of State on the viability of suggested compensation measures prior to consent being granted[143].

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 the National Site Network as required by Regulations 29 and 36 of the Offshore Habitats Regulations.

11.3 Haisborough, Hammond and Winterton SAC

The final version of the Applicant's in-principle compensatory measures submitted after Examination proposed an extension of the Haisborough, Hammond and Winterton SAC. The proposals included providing support to the statutory bodies to progress the designation. Schedule 17 of the dDCO secures the delivery of a strategy to promote an extension of the SAC. The proposals stipulated that the strategy must be in accordance with the in-principle plan[144].

[142] Natural England (2020). *Norfolk Vanguard – Applicant's submission to Secretary of State Consultation Request for further information*. 27 April 2020.

[143] The Royal Society for the Protection of Birds (2020). *Written Submission for The Royal Society for the Protection of Birds – Response to the Secretary of State's Consultations*. 22 April 2020.

[144] Royal HaskoningDHV (2020). *Norfolk Vanguard Offshore Wind Farm – Habitats Regulations Derogation, Provision of Evidence Appendix 3 – Haisborough, Hammond and Winterton Special Area of Conservation (SAC) – In Principle Compensation Measures.* 28 February 2020.

The Applicant noted that once the extension had achieved the status of a potential SAC ("pSAC"), compensation would be effective for the Project. The Applicant would provide ongoing support during the formal consultation process to the SNCBs, most likely through funding a post for approximately three to four years.

The Applicant stated that the details of the size and location would be agreed with the Secretary of State, the SNCBs, the MMO and Defra, following the conclusions of the Secretary of State in relation to adverse effect on integrity of the SAC. The area of any extension would likely be at least 20 ha. There is clear evidence of potential for extension where areas of Annex I Sandbank and Reef features stretch beyond the boundaries of the SAC.

The Applicant noted that there is some degree of uncertainty about securing the SAC extension, but stated that the pSAC designation would provide short-term compensation. If the consultation responses on the pSAC were unfavourable, the Applicant would be responsible for identifying alternative measures.

The Applicant considered several other potential compensation measures but discounted them:

- Establishment of a new reef feature within the SAC: discounted because of the difficulty of directly establishing *S. spinulosa* reef. There is little evidence that other forms of biogenic reef can be established apart from native oyster beds. Native oyster beds are not classed as Annex I habitat under the Habitats Directive so would not contribute to the coherence of the National Site Network;
- Fisheries management to reduce intrusive fishing methods: discounted because no authority has the jurisdiction to deliver fisheries management areas as compensation; and
- Removal of disused anthropogenic infrastructure and litter such as cables, pipelines and fishing gear from the SAC seabed: discounted because where infrastructure is approaching the end of its life, it will be the owner's responsibility to decommission it, so it would not provide additional compensation. Furthermore, the EIFCA was unable to identify any areas of lost fishing gear that could be removed. The Applicant did not consider that it could demonstrate that the measures would be feasible.

NE agreed with the proposal to extend the SAC, but requested more detail. Due to the practical challenges and potential policy issues in securing the compensation it recommended consultation with Defra, other regulators and key stakeholders[145].

The EIFCA raised concerns about the proposals to extend the SAC. It was concerned about the potential socio-economic effects which could result from the SAC extension, particularly in relation to potential requirements for further fisheries management. It considered that insufficient information had been provided to allow the Secretary of State to make a judgement about the impacts of SAC extension on marine ecology and sea users. It stated that it would be supportive, in principle, of measures to remove disused infrastructure[146].

TWT was concerned about the feasibility of extending the SAC because of the timescales and resources required. It also considered that this approach could undermine the status of other designated sites and create problems for the future consenting of other offshore wind farms. It considered that fisheries management measures should be delivered at a strategic level to allow headroom for individual offshore

[145] Natural England (2020). *Norfolk Vanguard – Applicant's submission to Secretary of State Consultation Request for further information*. 27 April 2020.

[146] Eastern Inshore Fisheries and Conservation Authority (2020). *Response to the Applicant's document EN010079-004230-8.25 Appendix 3 HHW SAC In-Principle Compensatory Measures*. 27 April 2020.

wind farms. It did not consider that the removal of litter and infrastructure met the EU and Defra guidance on compensatory measures[147].

The Secretary of State considered that the wording in the rDCO offers a useful mechanism for securing compensatory measures. However, the Secretary of State is concerned that there is considerable uncertainty about the feasibility of delivering the extension of the SAC before the Project becomes operational. The Secretary of State was therefore unable to conclude that a package of compensatory 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.

11.4 Additional Environmental Information

11.4.1 Alde-Ore Estuary SPA

On 5 July 2021 the Secretary of State wrote to the Applicant for additional environmental information on the in-principle compensation measures proposed for the Alde-Ore Estuary SPA[148]. Further information was sought to confirm whether any strategic compensation measures had been considered; to provide evidence of how the compensation site(s) would be acquired/leased; and to confirm the timetable for implementing the compensation measures and delivering their objectives.

On the 2 August 2021, in response to the request for additional environmental information, the Applicant provided the following[149]:

- The Applicant confirmed that they were working collaboratively with Scottish Power Renewables to deliver strategic compensation measures for several offshore windfarms.
- The Applicant confirmed that they were working with landowners to secure land to deliver the compensation measures.
- Annual monitoring was proposed to estimate breeding success. Furthermore, regular checks of the fence were proposed to identify any damage requiring repairs. Both monitoring measures would continue for the lifetime of the Project. The habitats within the enclosure would also be managed outside the breeding season to ensure it continued to provide suitable habitat for nesting gulls.
- A detailed implementation strategy was provided proposing the following programme:
  - Appointment of relevant stakeholders to a stakeholder working group (Q3 2021);
  - The necessary land ownership and access agreements to be obtained (Q4 2021-Q2 2022);
  - If necessary, planning permission (and any other consents) for fencing (Q1-2 2022);
  - Detailed designs to be finalised, and a specialist contractor to be appointed (Q2-3 2022);

[147] The Wildlife Trusts (2020). *Responses from The Wildlife Trusts on further information submitted by Norfolk Vanguard to the Secretary of State for Business, Energy and Industrial Strategy*. 27 April 2020.

[148] BEIS (2021). *Application by Norfolk Vanguard Limited ("the Applicant") for an Order granting Development Consent for the proposed Norfolk Vanguard Offshore Wind Farm and associated offshore and onshore infrastructure ("the Norfolk Vanguard project").* 5 July 2021.

[149] MacArthur Green (2021). Norfolk Vanguard Offshore Wind Farm In Principle Habitats Regulations Derogation Provision of Evidence – Appendix 2 Alde-Ore Estuary SPA In Principle Compensation.

- Habitat management within the enclosure to be undertaken and trapping out of mammals. (Q3-4 2022); and
- Annual monitoring to estimate breeding success. Regular checks of the fence to identify any problems (to continue for the lifetime of the Project). The habitat within the enclosure would also be managed outside the breeding season to provide suitable habitat for gull breeding.

In its written submission during the redetermination of the Project, the RSPB raised concerns which were similar to those detailed in its April 2020 comments on compensation measures for the lesser black-backed gull feature of the Alde-Ore Estuary SPA. It also expressed concerns that there was a reliance on predator fencing to achieve a more successful breeding colony of lesser black-backed gulls, and that other fundamental ecological requirements of the species, such as suitable nest sites and associated habitat structure, food availability, disturbance were not addressed. It was not satisfied that the overall coherence of the National Site Network would be protected[150].

On the 19 November 2021, in response to the Secretary of State's request for comments from IPs on the Applicant's previous submissions[151], the Applicant provided the following details:

- The Applicant confirmed that a land parcel within the Alde-Ore Estuary SPA had been identified for the mammal predator control area. Furthermore, the Applicant confirmed that they were negotiating Heads of Terms with the landowner to secure the lease of the site[152] [153].

NE agreed that New Zealand-style predator fencing would create safe nesting conditions for nesting lesser black-backed gull. It highlighted the need to ensure the presence of SAC/SSSI habitats within parts of the land parcel identified for compensation and for compensation to be installed before the breeding season prior to the operation of any turbine[154].

11.4.2 Flamborough and Filey Coast SPA

On 5 July 2021 the Secretary of State wrote to the Applicant for additional environmental information on the in-principle compensation measures[155]. Further details were sought to provide description of the compensatory measures proposed; evidence of how compensation site(s) for kittiwakes would be acquired/leased; to confirm the proposed timetable for implementing the kittiwake compensation measures and delivering the compensation objectives; and details of any proposed routine maintenance and population monitoring during the Project lifetime along with their funding mechanisms for delivery.

[150] The Royal Society for the Protection of Birds (2021). *Written Submission for the Royal Society for the Protection of Birds Annex 2 Alde-Ore Estuary SPA.* 19 November 2021.

[151] BEIS (2021). *Application by Norfolk Vanguard Limited ("the Applicant") for an Order granting Development Consent for the proposed Norfolk Vanguard Offshore Wind Farm and associated offshore and onshore infrastructure ("the Norfolk Vanguard project").* 11 October 2021.

[152] Royal HaskoningDHV (2021). *Norfolk Vanguard Offshore Wind Farm Summary of the Applicant's Negotiations on Compensatory Sites for Ornithology*. November 2021.

[153] MacArthur Green (2021). *Norfolk Vanguard Offshore Wind Farm In Principle Habitats Regulations Derogation Provision of Evidence Appendix 2 Alde-Ore Estuary SPA In Principle Compensation*. November 2021.

[154] Natural England (2021). *Norfolk Vanguard – Consultation on Applicant's response to the Secretary of State's Additional Information Request.* 19 November 2021.

[155] BEIS (2021). *Application by Norfolk Vanguard Limited ("the Applicant") for an Order granting Development Consent for the proposed Norfolk Vanguard Offshore Wind Farm and associated offshore and onshore infrastructure ("the Norfolk Vanguard project").* 5 July 2021.

On the 2 August 2021, in response to the request for additional environmental information, the Applicant provided the following[156]:

- The Applicant confirmed that they were in discussions with Associated British Ports and other landowners to secure kittiwake compensation sites.
- A detailed implementation strategy was provided proposing the following programme:
    - Concept designs for two possible structures to be completed by end of June 2021;
    - Study of breeding success to be completed by August 2021;
    - Screening and early consultation with the Local Planning Authority;
    - Detailed designs for the structures to be completed after the breeding success survey;
    - Results of survey and detailed designs to be shared with stakeholders in August 2021;
    - Detailed designs updated following stakeholder input;
    - Identification of the structure location and engagement on location suitability;
    - Planning Application submitted end of October 2021;
    - Procurement of structure(s) to be completed end of November 2021;
    - Planning approved mid-January 2022;
    - Manufacturing of structures complete by the end of January 2022;
    - Installation complete by the middle of February 2022;
    - Ready for colonisation by the end of February 2022;
    - Monitoring success of the colonies and adaptive management throughout the Project lifetime;
    - Start of offshore construction of the Project April 2025;
    - First cohort from the colony reaches breeding age and is available to recruit to the breeding population (e.g. to Flamborough and Filey Coast SPA) in spring 2026;
    - First generation Q2 2026.

On the 19 November 2021, in response to the Secretary of State's request for comments from IPs on the Applicant's previous submissions[157], the Applicant provided the following details:

- The Applicant confirmed that several sites within the Port of Lowestoft had been identified for the artificial nest sites and Heads of Terms with the port to secure the lease of the sites were under negotiation. Furthermore, other locations were being considered and discussions were progressing with landowners within Great Yarmouth Borough Council, and Peel Ports Great Yarmouth Port Landholding[158] [159].

NE agreed that the proposed compensation measures would provide additional adult kittiwake into the wider biogeographic population from which the SPA draws its recruits[160]. However, due to the uncertainty

[156] MacArthur Green (2021) *Norfolk Vanguard Offshore Habitats Regulations Derogation Provision of Evidence Appendix 1 Flamborough and Filey Coast SPA In Principle Compensation*. July 2021.

[157] BEIS (2021). *Application by Norfolk Vanguard Limited ("the Applicant") for an Order granting Development Consent for the proposed Norfolk Vanguard Offshore Wind Farm and associated offshore and onshore infrastructure ("the Norfolk Vanguard project").* 11 October 2021.

[158] Royal HaskoningDHV (2021). *Norfolk Vanguard Offshore Wind Farm Summary of the Applicant's Negotiations on Compensatory Sites for Ornithology*. November 2021.

[159] MacArthur Green (2021). *Norfolk Vanguard Offshore Wind Farm In Principle Habitats Regulations Derogation Provision of Evidence Appendix 1 Flamborough and Filey Coast SPA In Principle Compensation.* July 2021.

[160] Natural England (2021). *Norfolk Vanguard – Consultation on Applicant's response to the Secretary of State's Additional Information Request.* 19 November 2021.

regarding the extent to which the proposal will directly benefit the SPA, NE suggested that the benefits come from increasing the robustness of the wider UK kittiwake population, therefore it would be appropriate for the measure to deliver benefits at a scale greater than the impacts felt at the SPA.

NE also expressed concerns around the following issues:

- The details of the location and design of the compensation measures should be provided prior to determination;
- The Project's DCO/dML only requires them to submit a compensation plan to the Secretary of State prior to the operation of any wind turbine and there is no requirement for the compensation to be in place or functional prior to impact; and
- The use of a single structure reduces the chances of success and the use of more than one structure would spread the risk if one structure failed to attract birds.

In their submission dated 19 November 2021[161], the RSPB raised similar concerns detailed in its April 2020 comments on compensation measures for the kittiwake feature of the Flamborough and Filey Coast SPA. Amongst other concerns, the RSPB noted that birds recruited to the artificial nesting structures located in Lowestoft/Suffolk could be vulnerable to collision risk, and this had not been addressed. Furthermore, any artificial nesting structure located in the Port of Lowestoft is unlikely to function as compensation during the redevelopment of the port and there is a lack of evidence that a 50 m buffer around all construction activity would be sufficient to mitigate disturbance to nesting structures.

11.4.3 Haisborough, Hammond and Winterton SAC

In their letter dated February 2021[162], Defra expressed concerns around the proposed strategy by Norfolk Boreas to compensate for impacts on the Annex I Sandbank and Reef features of Haisborough, Hammond and Winterton SAC. In summary, Defra's position was that SACs could only be designated based on relevant scientific evidence, and that extending designated sites or creating new site designations as compensatory measures for a development, would not comply with the legislation.

Defra also confirmed that the process of extending SACs is complex, and that there was no certainty that the proposed research would result in a recommendation for designation. Therefore, the compensation measures could not be secured before construction, unless a project was delayed for several years.

NE stated that extending the SAC, along with removal of redundant surface laid infrastructure that wouldn't otherwise be removed, were the compensatory measures most likely to achieve the required environmental outcomes. However, NE did not consider that the removal of marine debris and an awareness campaign would provide compensatory measures for the predicted impacts of the Project on Haisborough, Hammond and Winterton SAC, because the presence of marine debris is not impeding the conservation objectives of the site from being met. Furthermore, there is concern that debris removal activities could be detrimental to the conservation objectives of the site[163].

[161] The Royal Society for the Protection of Birds (2021). *Written Submission for the Royal Society for the Protection of Birds Annex 1 Flamborough and Filey Coast SPA.* 19 November 2021.

[162] Defra (2021). *Defra Letter Ref: 210225.*

[163] Natural England (2021). *Norfolk Vanguard – Consultation on Applicant's response to the Secretary of State's Additional Information Request.* 19 November 2021.

NE considered the additional information on the recovery of Annex I Sandbanks and concluded that current assessments suggest that sandbank recovery is possible; however, further data is required to remove all reasonable scientific doubt.

NE advised that to address the need for evidence to improve our understanding of the timescales for recovery, monitoring similar in scope to the Larsen et al. (2019) surveys should be undertaken of all areas where sandwave sweeping/levelling occurs within the SAC and the surveys should be repeated until the sandbanks are considered by the regulator (in consultation with NE) to have recovered.

In their letter dated 19 November 2021[164], TWT presented comments on the proposed compensation for impacts on the sandbank and reef features of Haisborough, Hammond and Winterton SAC. TWT's preferred compensation measures were the implementation of fisheries management measures and to exploit early opportunities as part of the Offshore Transmission Network. TWT withdrew its support for the removal of redundant oil and gas infrastructure reverting back to the position that removal and decommissioning of infrastructure should follow the polluter pays principle.

TWT did not consider that marine debris removal and the associated awareness campaign would provide compensation for the loss of habitats from cable protection. In TWT's view further site decline would be expected if these measures were implemented as compensation, and the coherence of the National Site Network would not be achieved, contravening the requirements of the Habitats Regulations.

TWT were not supportive of the proposal to extend the SAC, because of the uncertainty that this could be achieved. Furthermore, TWT note that extending the SAC could create problems for future for offshore wind farm development, complicating the consenting process and putting the ecological integrity of the UK MPA network at risk.

On 5 July 2021 the Secretary of State wrote to the Applicant[165] to request consideration of the February 2021 letter published by Defra and for details of alternative compensation strategies for the Annex I Reef and Sandbank features.

On the 2 August 2021, in response to the request for additional environmental information, the Applicant provided the following[166]:

- The Applicant confirmed that the removal of disused infrastructure and extension of the SAC were the preferred compensation options, should an adverse effect on the integrity on the Annex I Sandbank and Reef features of the SAC be identified.

On 11 October 2021, the Secretary of State wrote to the Applicant[167] to confirm the number of marine debris retrieval campaigns being proposed; and to identify the existing oil and gas infrastructure proposed for removal, and details of the engagement with the current owners of such infrastructure.

[164] The Wildlife Trust (2021). *Response to Norfolk Vanguard re*-determination. TWT Letter Ref 20012715.

[165] BEIS (2021). *Application by Norfolk Vanguard Limited ("the Applicant") for an Order granting Development Consent for the proposed Norfolk Vanguard Offshore Wind Farm and associated offshore and onshore infrastructure ("the Norfolk Vanguard project").* 5 July 2021.

[166] Royal HaskoningDHV (2021) *Norfolk Vanguard Offshore Wind Farm In Principle Habitats Regulations Derogation, Provision of Evidence – Appendix 3 Haisborough, Hammond and Winterton SAC In Principle Compensation (Version 2)*. 2 August 2021.

[167] *BEIS (2021). Application by Norfolk Vanguard Limited ("the Applicant") for an Order granting Development Consent for the proposed Norfolk Vanguard Offshore Wind Farm and associated offshore and onshore infrastructure ("the Norfolk Vanguard project").* 11 October 2021.

Furthermore, details of modifications to this Project, which would avoid the need for all cable rock protection within the SAC and information to demonstrate that all reefs can be avoided during cable installation was sought.

On the 18 November 2021, in response to the request for additional environmental information, the Applicant provided the following:

- The Applicant confirmed that the proposal was to undertake a single marine litter removal campaign; however, further campaigns could be undertaken during the operation of the windfarm, if during the development of the strategy it was concluded that this would be beneficial[168].

[168] Royal HaskoningDHV (2021) *Norfolk Vanguard Offshore Wind Farm In Principle Habitats Regulations Derogation, Provision of Evidence – Appendix 3 Haisborough, Hammond and Winterton SAC In Principle Compensation (Version 2)*. 21 October 2021.

12 Conclusions

The Secretary of State concludes that an adverse effect on the integrity of the Flamborough and Filey Coast SPA because of the impacts on the kittiwake population from the Project, in combination with other projects, cannot be excluded.

The Secretary of State also concludes that an adverse effect on the integrity of the Alde-Ore Estuary SPA because of the impacts on the lesser black-backed gull population from the Project, in combination with other projects, cannot be excluded.

Finally, the Secretary of State concludes that an adverse effect on the integrity of the Haisborough, Hammond and Winterton SAC because of the impacts on Annex I Sandbank and Reef features from the Project, alone or in combination with other projects, cannot be excluded.

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. The Secretary of State is also satisfied that the public benefits of the Project would outweigh the impacts to the Flamborough and Filey Coast SPA, Alde-Ore Estuary SPA, and the Haisborough, Hammond and Winterton SAC, and that necessary compensatory measures to ensure that the overall coherence of the National Site Network can be secured. The final specifications of these packages that the Applicant must deliver are set out below.

12.1 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 agrees that the objective of the compensation as the recruitment of 2.6 adult lesser black-backed gulls into the Alde-Ore Estuary SPA population per year is appropriate, and that the following measures can be addressed as conditions of the DCO:

- A Lesser Black-Backed Gull Steering Group (“LBBGSG”) 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 LBBGSG.
  ii. The membership of the LBBGSG.
  iii. The schedule for meetings; the reporting and review periods; and the timetable for production of the Lesser Black-Backed Gull Implementation and Management Plan (“LBBGIMP”).
  iv. The dispute resolution mechanism.

- A LBBGIMP must be developed by the Applicant in consultation with LBBGSG to deliver the strategy set out in the in-principle compensation measures. The LBBGIMP must be submitted to the Secretary of State for approval (in consultation with the LBBGSG) 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). Each breeding season is assumed to have commenced on 1 March in each year and ended on 30 September. The LBBGIMP 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 LBBGIMP.
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 monitoring strategy including: survey methods; survey programmes; success criteria; and details of the factors used to trigger adaptive management measures.
v. Details of the habitat management and fence maintenance schedules.
vi. Minutes from all consultations with LBBGSG.

- Results from the monitoring scheme must be submitted annually to the Secretary of State, and NE. 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 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 NE.

- 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.

The Secretary of State notes that the 4 ha of enclosed space proposed by the Applicant could contain the target population of 14,000, which significantly overcompensates for the 2.6 birds predicted to be killed by the Project. The Applicant stated that it would likely not be appropriate to enclose an area much smaller than 4 ha in order to minimise the risk that the birds do not use the enclosed space.

The Applicant also highlighted that in principle compensatory measures had been requested for the lesser black-backed gull feature of the SPA for other offshore wind farms (Norfolk Boreas, East Anglia One North and East Anglia Two). It suggested that the proposed compensatory measures could be delivered as a joint form of compensation since the magnitude of compensation proposed by the measures far outweighs both the individual and combined effects of these projects. The details of the size of the enclosed space and how other projects may contribute to its delivery and management will be decided as part of the LBBGIMP delivery.

The Secretary of State has secured compensatory measures for the effects of Norfolk Boreas on the lesser black-backed gull feature of the Alde-Ore Estuary. This compensation is identical to what he has secured for the Project and therefore both projects rely on the same 4 ha of enclosed space, however each Project must compensate for its own alone impact.

12.2 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 agrees that the objective of the compensation is to

provide 21 adult kittiwakes per year which could be recruited into the Flamborough and Filey Coast SPA population and that the following measures can be addressed as conditions of the DCO:

- A Kittiwake Steering Group ("KSG") must be established, and the following details must be approved by the Secretary of State prior to the commencement of the authorised project:

  v. The Terms of Reference of the KSG.
  vi. The membership of the KSG.
  vii. The schedule for meetings; the reporting and review periods; and the timetable for production of the Kittiwake Implementation and Monitoring Plan ("KIMP").
  viii. The dispute resolution mechanism.

- A Kittiwake Implementation and Monitoring Plan ("KIMP") must be developed by the Applicant in consultation with the KSG. The KIMP must deliver the strategy set out in the in-principal compensation strategy and be submitted to the Secretary of State for approval (in consultation with the KSG) 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). Each breeding season is assumed to have commenced on 1 March in each year and ended on 30 September. 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 the design(s) of artificial nest sites including the number of nesting structures; and how risks from avian or mammalian predation, and unauthorised human access have 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 monitoring strategy including: survey methods; survey programmes; success criteria; details of the factors used to trigger adaptive management measures; and annual reporting to the Secretary of State.
  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 compensation measures. Evidence of natal dispersal and colony interchange with the Flamborough and Filey Coast SPA kittiwake colony should be investigated, potentially using the colour-ringing of chicks.
  vi. Details of the artificial nesting site maintenance schedule.
  vii. Minutes from all consultations with KSG.

- Results from the monitoring scheme must be submitted annually to the Secretary of State and NE. 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 NE.

- 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 compensation measures, and monitoring should continue whilst the artificial nesting structures are in place.

12.3 Benthic Habitats Compensation

With regards to benthic habitats within Haisborough, Hammond and Winterton SAC, the Secretary of State notes the range of compensatory measures proposed by the Applicant and has concluded that due to the difficulties associated with securing an extension to the SAC, and the legislation around removing disused oil and gas infrastructure, the removal of marine debris from benthic habitats within SAC prior to the start of the construction works represents the most feasible and appropriate compensation measure available.

It is estimated that under the Applicant's worst-case scenario, 2.4 ha of sandbank habitat within the SAC could be lost to cable protection from the Project alone and a further 5.9 ha of reef habitat within the SAC could be disturbed by cable installation from the Project alone and in-combination with Norfolk Boreas. As the Project shares an offshore cable corridor with Norfolk Boreas the impact of reef disturbance lies with the project which constructs first. In principle, the project which proceeds to construction first should compensate for 5.9 ha of reef disturbance and the subsequent project should not be obliged to compensate.

Therefore, the Project must compensate for at least 2.4 ha and up to a maximum of 8.3 ha of benthic habitat. The 8.3 ha total comprises 2.4 ha to compensate for the Project's adverse effects alone upon sandbank habitats, and a further 5.9 ha to compensate for the Project's shared adverse effects upon reef habitats with Norfolk Boreas, unless it can be demonstrated that the compensation delivered for reef habitats through the Norfolk Boreas Development Consent Order has sufficiently compensated for the 5.9 ha impacts of both Projects upon reef habitats in-combination.

The Secretary of State notes that marine debris could degrade the SAC through the abrasion and smothering of benthic habitats; the dislodging of organisms and seabed features; and from polluting the marine environment with micro-plastics arising from the disintegration of plastic debris. The removal of marine debris will improve the condition of the SAC by reducing the risk of damage to benthic habitats, including reefs. The removal of debris will also expose the underlying substrates that constitute the benthic ecosystem and allow the recovery of endemic epifaunal communities. Furthermore, removing a source of anthropogenic pollution will reduce adverse pressures on the biological assemblage. This will contribute to the conservation objectives of the SAC by restoring the extent and distribution of qualifying natural habitats, and the habitats of qualifying species; and restoring the structure and function of qualifying natural habitats, and the habitats of qualifying species.

The following measures are considered appropriate compensation for the potential impacts on the SAC and will be secured by conditions in the DCO:

- The Applicant must establish a Benthic Steering Group ("BSG") to inform the preparation of the Benthic Implementation and Monitoring Plan ("BIMP"). The BSG must be consulted on the final BIMP prior to submission to the Secretary of State and during the approval process. The Applicant must consult with and report to the BSG annually in the establishment and implementation phases of the Project and document the conclusions of the meetings. The following details of the BSG must be submitted to and approved by the Secretary of State prior to the commencement of the offshore cable installation works:

  i. Terms of Reference of the BSG.
  ii. The membership of the BSG.
  iii. The schedule of meetings, reporting and review periods; and the timetable for the preparation of the BIMP.
  iv. The dispute resolution mechanism.

No offshore cable installation works in the Haisborough Hammond and Winterton SAC to commence until a final BIMP has been approved in writing by the Secretary of State (in consultation with the MMO and NE).

- The BIMP must accord with the principles set out in the in-principal compensation strategy relating to the protected features, and must include the following details:

  i. Details of how impacts to protected reef habitats within the Haisborough Hammond and Winterton SAC will be avoided where possible and details of any other mitigations that were originally included in the Haisborough, Hammond and Winterton SAC Site Integrity Plan.
  ii. Details of the locations for the disposal of dredged material, and evidence that the disposal mechanism will allow sediment to be retained within the sandbank system and avoid impacts to other features, particularly reef habitats.
  iii. Details of the areas which will be subject to marine debris removal. The total area of debris removed should equate to no less than the area required to compensate for the predicted effects of cable installation and protection but taking into account what might have already been delivered under the Norfolk Boreas Development Consent Order in relation to the in-combination effects on reef habitats. Should the total area of debris identified be less that the area required to compensate for the impacts of the Project, then in accordance with Defra's guidance on compensation measures, further debris removal will be undertaken at alternative protected sites to benefit other reef and sandbank features within the National Site Network.
  iv. A method statement for its removal, to include the vessel type, tools used and mitigation for how impacts on habitats will be minimised.
  v. A programme of delivery for education, awareness and provision of facilities to reduce further marine debris from affecting the SAC.
  vi. An environmental monitoring plan to include: appropriate surveys to assess the effects of cable installation on sandbank recovery, sediment movement and epifauna assemblages during the operation of the Project; and appropriate surveys to monitor the recovery of benthic habitats in areas impacted by cable protection, post-decommissioning.
  vii. Details of the timetable for the implementation measures to ensure that no cable installation works in the SAC may be commenced unless the required area (at least 2.4ha and up to 8.3ha) of marine litter has been removed, in accordance with the programme referred to in paragraph 29(d) of Schedule 19 Part 3.

- Results from the monitoring surveys must be submitted annually to the Secretary of State, the MMO and NE. This must include details of any findings that the measures have been ineffective in securing an improvement in the condition of the SAC 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 the MMO and NE.
- A report which demonstrates completion of the activities required by the approved strategy must be submitted within 12 months of completion for approval by the Secretary of State, in consultation with the Marine Management Organisation and Natural England.

The compensation measures for the Project referred to in this HRA will be secured and delivered through the DCO as set out in Schedule 19.

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