Department for Energy Security & Net Zero

Habitats Regulations Assessment for an Application Under the Planning Act 2008

SHERINGHAM SHOAL AND DUDGEON EXTENSIONS OFFSHORE WIND FARM PROJECTS

Regulation 63, 64 and 68 of the Conservation of Habitats and Species Regulations 2017

Regulation 28, 29 and 36 of the Conservation of Offshore Marine Habitats and Species Regulations 2017

Regulation 125 of the Marine and Coastal Access Act 2009

April 2024

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Contents

List of abbreviations

Term	Abbreviation
(draft) Development Consent Order	(d)DCO
Adverse Effect on Integrity	AEoI
Appropriate Assessment	AA
Artificial Nesting Structure	ANS
British Energy Security Strategy	BESS
Code of Construction Practice	CoCP
Committee on Climate Change	CCC
Compensation Implementation and Monitoring Plan	CIMP
Compensation Measures Document	CMD
Compensation Measures Update	CMU
Cornwall Inshore Fisheries Conservation Authority	CIFCA
Deemed Marine Licence	DML
Development Consent Order	DCO
Dudgeon Offshore Wind Farm Extension Project	DEP
Environmental Impact Assessment	EIA
European Economic Area	EEA
Examining Authority	ExA
Exclusive Economic Zone	EEZ
Guillemot Compensation Steering Group	GCSG

Habitats Regulations Assessment	HRA
High Voltage Alternating Current	HVAC
Horizontal Directional Drilling	HDD
Imperative reason of Overriding Public Interest	IROPI
Interested Parties	IPs
Joint Nature and Conservation Committee	JNCC
Kilometre	km
Kittiwake Compensation Steering Group	KCSG
Likely Significant Effect	LSE
Looming Eye Buoy	LEB
Lowest Astronomical Tide	LAT
Marine Mammal Mitigation Protocol	MMMP
Marine Management Organisation	MMO
Megawatts	MW
National Site Network	NSN
Nationally Significant Infrastructure Project	NSIP
Natural England	NE
Offshore Substation Platform	OSP
Outline Ecological Management Plan	OEMP
Permanent Threshold Shift	PTS
Planning Inspectorate	PINS
Preliminary Environmental Information	PEIR
Relevant Representation	RR
Report on the Implications for European Sites	RIES
Report to Inform Appropriate Assessment	RIAA
Sandwich Tern Compensation Steering Group	STCSG
Seabed Sediment Concentration	SSC
Sheringham Shoal Offshore Wind Farm Extension Project	SEP

Site Integrity Plan	SIP
Special Area of Conservation	SAC
Special Protection Area	SPA
Statement of Common Ground	SoCG
Statutory Nature Conservation Body	SNCB
Supplementary Advice on Conservation Objectives	SACO
Temporary Threshold Shift	TTS
The Conservation of Habitats and Species Regulations 2017	The Habitats Regulations
The Royal Society for the Protection of Birds	RSPB
Unexploded Ordnance	UXO
Wind Turbine Generators	WTGs

1 Introduction

1.1 Background

This is a record of the Habitats Regulations Assessment (HRA) that the Secretary of State for the Department of Energy Security and Net Zero has undertaken under the Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations) (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (the Offshore Habitats Regulations) (as amended) in respect of the Development Consent Order (DCO) and Deemed Marine Licences (DMLs) for the Sheringham Shoal Offshore Wind Farm Extension Project (SEP) and the Dudgeon Offshore Wind Farm Extension Project (DEP) along with their associated infrastructure. Combined they make the Sheringham Shoal and Dudgeon Offshore Wind Farm Project (the Project).

The Examining Authority (ExA) in its report describes this as the "Proposed Development". It is defined as the "Project" within this HRA for consistency with the terminology of the Habitats Regulations. For the purposes of these Regulations the Secretary of State is the competent authority.

The Project would comprise the construction and operation of two offshore windfarms comprising several onshore and offshore elements. The SEP wind turbine array is located, at its closest point, approximately 15.8 kilometres (km) off the north Norfolk coast and the DEP 26.5km off the north Norfolk coast within the UK's Exclusive Economic Zone (EEZ). The Project application is described in more detail in Section 2.

There are three proposed array areas: SEP offshore site, DEP North array area and DEP South array area. In total, the array areas would cover 211.75km^2. Although all three array areas are distinct and non-contiguous, they all adjoin existing operational wind farms.

The DEP North array area and DEP South array area adjoin northwest and southeast of the existing Dudgeon Offshore Windfarm, respectively. SEP offshore site is along the northern boundary of the existing Sheringham Shoal Offshore Windfarm.

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 with a capacity over 100 megawatts (MW).

The Project was accepted for Examination by the Planning Inspectorate (PINS) on 3 October 2022 and a five-member Panel of Inspectors was appointed as the ExA for the Application. The Examination of the Project application began on 17 January 2023 and completed on 17 July 2023. The ExA submitted its report of findings and conclusions of the Examination, including its recommendation (the ExA's Report), to the Secretary of State on 17 October 2023. Numbered references to the ExA's Report are presented in the format "[ER *.*.*]".

1.2 Habitats Regulations Assessment (HRA)

The Habitats Regulations and 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. The Secretary of State notes the Project 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). They 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 from part of the UK's National Site Network (NSN).

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 NSN (collectively referred to in this HRA as "protected sites).

Candidate SACs (cSACs), SACs and SPAs are afforded protection as protected sites. As a matter of policy[1] the Government affords potential SPAs (pSPAs) the same level of protection.

Regulation 63 of the Habitats Regulations provides that:

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

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:

[1] NPS EN-1 para 5.3.9

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 Project is not directly connected with, or necessary to, the management of a protected site. The Habitats Regulations require that, where the Project is likely to have a significant effect (LSE) on any such site, alone or in-combination with other plans and projects, an appropriate assessment (AA) is carried out to determine whether the Project will have an adverse effect on the integrity (AEoI) of the site in view of that site's conservation objectives. In this document, the following assessments are collectively referred to as the HRA:

- Stage 1: Assessment of LSE;
- Stage 2: AA to determine whether there is an AEoI of a site;
- Stage 3: Assessment of Alternative Solutions;
- Stage 4: Imperative Reasons of Overriding Public Interest (IROPI); and
- Stage 5: Proposed Compensatory Measures.

The Secretary of State has had regard to relevant guidance on the application of HRA published by the Planning Inspectorate (2017) (Advice Note 10)[2] , the European Commission (2018)[3], joint guidance by Defra, NE, the Welsh Government and Natural Resources Wales (2021) on 'Habitats Regulations Assessment: protecting a European site' (the "2021 joint guidance)[4].

1.3 Site Conservation Objectives

Where an AA is required in respect of a protected site, regulation 63(1) of the Habitats Regulations (and regulation 28(1) of the Offshore Habitats Regulations) requires that it be an AA of the implications of the plan or project for the site in view of its conservation objectives. Government guidance also recommends that in carrying out the LSE screening, applicants must check if the proposal could have a significant effect on a protected site that could affect its conservation objectives.

[2] The Planning Inspectorate (2017): 'Advice Note Ten: Habitats Regulations Assessment Relevant to Nationally Significant Infrastructure Projects'.

[3] European Commission (2019), Directorate-General for Environment, Managing Natura 2000 sites – The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Publications Office, 2019: https://data.europa.eu/doi/10.2779/02245

[4] Defra, NE, the Welsh Government and Natural Resources Wales (2021) 'Habitats Regulations Assessment: protecting a European site': https://www.gov.uk/guidance/habitats-regulations-assessments-protecting-a-european-site

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[5]. 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"*.

Conservation objectives have been established by Natural England (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 (AEoI) 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 on conservation objectives (SACOs) 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. SACOs are subject to availability and are currently being updated on a rolling basis.

Where supplementary advice is not yet available for a site, NE[6] 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 Habitats Regulations. 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;

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

[6] http://publications.naturalengland.org.uk/publication/6734992977690624?cache=1656417868.31

- 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 Applicant's Report to Inform Appropriate Assessment (RIAA) and associated Appendices [APP-059 to APP-076] along with updates made during examination [REP4-008 to REP4-013] summarised site-specific information for all designated sites screened in by the Applicant along with their conservation objectives.

The conservation objectives and, where available, SACOs have been used by the Secretary of State to consider whether the Project has the potential to have an AEoI of sites, either alone or in-combination with other plans or projects.

1.4 The Report on the Implications for European Sites and statutory consultation

Under Regulation 63(3) of the Habitats Regulations and Regulation 28(4) of the Offshore Habitats Regulations the competent authority must, for the purposes of an AA, consult the Statutory nature conservation body (SNCB) and have regard to any representation made by that body within such reasonable time as the authority specifies.

NE is the SNCB for England and for English waters within the 12 nm limit. The JNCC is the SNCB beyond 12 nm, but this duty has been discharged by NE following the 2013 Triennial Review of both organisations[7,8]. 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, with support from the Inspectorate's Environmental Services Team, produced a Report on the Implications for European Sites[9] (the RIES) [PD-020]. The purpose of the RIES was to compile, document and signpost information submitted by the Applicant and Interested Parties (IPs) during the examination (up until 13th June 2023). It was issued to ensure that IPs, including NE as the SNCB under Regulation 5 of the Habitats Regulations, had been formally consulted on Habitats Regulations matters in respect of the Application for the Project, during the Examination.

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

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

[9] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010109/EN010109-001141-Report%20on%20the%20Implications%20for%20European%20Sites.pdf

The RIES was published on the PINS NSIP web pages and the ExA notified IPs that it had been published. Consultation on the RIES was undertaken between 16 June 2023 and 10 July 2023. The Applicant [REP7-062] and NE [REP7-111] provided comments on the RIES at Deadline (D) 7.

Several Examination submissions at D 7 and D 8 included HRA-relevant information. NE [REP7-111] noted that the RIES did not take account of this information and advised that consultation on the RIES did not adequately discharge the statutory requirement to consult NE on AAs. Given the amount of information submitted following publication of the RIES, the ExA's recommendation [ER 26.1.11] was that the Secretary of State should undertake further consultation to fulfil the duties under Regulation 63(3) of the Habitats Regulations and Regulation 28(4) of the Offshore Habitats Regulations.

For the avoidance of doubt, the Secretary of State considers all representations made by all IPs on HRA matters throughout the entirety of the Examination process. She does not rely solely on consultation on the RIES to inform her conclusions on matters relevant to the HRA, but she does consider that the RIES can formally support her duties to consult on AA's. In this instance, the Secretary of State notes the late-stage provision of information relating to the HRA and NE's concern during Examination regarding the Secretary of State's duty to consult. The Secretary of State considers that the further rounds of consultation which she has issued since the close of Examination, including consulting with NE as the SNCB, in addition to the extensive consultation undertaken during Examination have adequately fulfilled her duties to consult on the AA under Regulation 63(3) of the Habitats Regulations and Regulation 28(4) of the Offshore Habitats Regulations.

1.5 Documents referred to in this HRA

This HRA has taken account of, and should be read in conjunction with, documents produced as part of the Application and Examination, together with the responses to the Secretary of State's requests for comments and further information which are available on the PINS NSIP web page[10]. In particular, but not limited to:

- The ExA's Report;
- The RIES [PD-020];
- The Report to Inform Appropriate Assessment (RIAA) [APP-059 to APP-062]
- Habitats Regulations Assessment Screening and Integrity Matrices (Revisions B) [REP4-008-013];
- Apportioning and Habitats Regulations Assessment Updates Technical Note (Revision E) [REP-038]
- Information to support the derogation case [APP-063 to APP-076, REP1-061, REP3-095, REP6-009, REP8-040];
- The final Statement of Common Ground with:

[10] https://infrastructure.planninginspectorate.gov.uk/projects/yorkshire-and-the-humber/hornsea-project-four-offshore-wind-farm/

  - NE (Onshore matters) [REP8-031];
  - NE (Derogation matters) [REP8-032];
  - NE (Offshore ornithology) [REP7-068];
  - NE (Offshore and intertidal ecology) [REP8-042]; and
  - The Royal Society for the Protection of Birds (RSPB) [REP8-116 REP8-117]; and
  - The MMO [REP8-030].
- Deadline 8 Submissions
  - Natural England Appendix A3 - Further Response to In-principle Monitoring Plan (Revision C) [REP8-101]
  - Natural England's Offshore Ornithology Position (Revision 2) [REP8-102]
  - Natural England Natural England's End of Examination Position on the Applicant's Proposed Compensatory Measures [REP8-103]
  - Natural England Further Advice on Marine Mammals Technical Note and Addendum [REP8-104]
  - Natural England Cromer MCZ Advice [REP8-105]
  - Natural England North Norfolk Council SPA and River Wensum SAC Summary Position [REP8-106]
- Responses to the Secretary of States consultation letters, issued on:
- 22 November 2023[11]; and
- 23 January 2024[12].

Plus, other information submitted during the Examination and during the Secretary of State's consideration of the Application. Several documents were revised during pre-Examination and Examination, as detailed in the Guide to the Application [REP8-002]. The Secretary of State has considered and assessed these documents, and key information from these documents is summarised in this report.

A Statement of Common Ground (SoCG) between the Applicant and NE on offshore Ornithology was first submitted at D 2 [REP2-045] and finalised at D 8 [REP8-043]. A SoCG on other offshore matters was submitted at D 2 [REP2-044] and finalised at D 8 [REP8-042]. A SoCG on derogation matters was first submitted at D 1 [REP1-047], D 8 [REP8-032]. A draft SoCG with NE relating to onshore matters was submitted at D 1 [REP1-046] and a final SoCG submitted at D 8 [REP8-031].

Subsequent references to the SoCGs between the Applicant and NE in this HRA Report are to the final versions, unless otherwise stated. The SoCGs confirmed that not all matters relating to HRA were agreed between the two parties, and that there were HRA matters outstanding between them in respect of the Project.

[11] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010109/EN010109-002248-Sheringham%20and%20Dudgeon%20-%20Consultation%20Letter%20221123.pdf

[12] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010109/EN010109-002294-SADEP%20SoS%20Consultation%20Letter%2023%20Jan%202024.pdf

2 Project description

The project description is presented in Chapter 4 of the application [APP-090].

SEP and DEP would comprise the following main offshore components:

- Wind turbines and their associated foundations;
- Offshore substation platforms (OSPs) and associated foundation/s; and
- Subsea cables and cable protection – offshore export cables, infield cables and interlink cables.

The main onshore components of SEP and DEP include:

- Landfall including transition joint bay;
- Up to two ducts installed under the beach at the landfall by Horizontal Directional Drilling (HDD));
- Onshore cable corridor, including:
    - Onshore export cables laid within open cut trenches or installed in ducts, and associated infrastructure including joint bays and link boxes;
    - Temporary construction access roads and haul roads;
    - Construction compounds; and
    - Trenchless crossings at sensitive features and habitats (e.g. A roads, main rivers and sites designated for nature conservation).
- Onshore substation, including:
    - Substation operational access road; and
    - Associated earthworks, surface water attenuation and/or landscaping

The final design for the Project may not be confirmed until after consent has been granted. Consequently, the Applicant has presented a Rochdale envelope approach whereby the maximum development scenarios are presented and assessed. The Design Scenarios are presented in a Scenarios Statement that provides an overview of the development scenarios within the DCO [APP-314].

The Rochdale envelope and the presented Design Scenarios provide sufficient flexibility within the project whilst ensuring that the environmental effects of the Project eventually constructed has been properly assessed. The realistic worst-case design scenarios assessed are outlined by the Applicant in its RIAA [APP-059].

The ExA is satisfied that sufficient detail on the worst-case scenario has been provided for all aspects of offshore construction and the information provided in the ES allows full assessment of these impacts [ER 27.2.77].

The Secretary of State's HRA is based upon the realistic worst-case design scenario of the project for each parameter in accordance with PINS Advice Note Nine[13].

A full description of each of the offshore and onshore Works Nos. 1 to 22, together with associated development, that together comprise the Project is contained in Schedule 1, Part 1

[13] https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-nine-rochdale-envelope/

of the draft DCO [APP-024]. Changes made to the draft DCO during examination did not materially affect the project description [ER 29.4.2].

The proposed Sheringham Shoal Extension wind farm array area is 97.0km^2, located approximately 15.8km from the north Norfolk coastline at its closest point. A maximum of 23 wind turbines are proposed, with the maximum rotor blade diameter of 300m.

The proposed Dudgeon Extension wind farm array area is 114.7km2, located approximately 26.5km off north Norfolk coast. A maximum of 30 wind turbines are proposed, with a maximum rotor blade diameter of 300m.

A single OSP could be placed within SEP, or one OSP within SEP and a second within DEP North. A 500m wide electricity export cable corridor from the wind farm site(s) will increase to 1000m wide when close to the coast at Weybourne with up to two ducts (one per project) installed under the intertidal area and cliff by HDD.

The power from the Sheringham Shoal Extension and Dudgeon Extension array areas to the UK National Grid will be transmitted using High Voltage Alternating Current (HVAC) with one cable circuits installed within the offshore export cable corridor.

There are two Offshore Cable Corridors between SEP and DEP. DEP North array and DEP South array areas will each have a dedicated Offshore Cable Corridor connecting to SEP. The Offshore Cable Corridor will exit SEP in the southeast quadrant and approach the landfall at Weybourne, North Norfolk, in a south-westerly direction.

The offshore export cables will make landfall at Weybourne and from there, the onshore export cables travel approximately 60km inland to a new HVAC onshore substation near to the existing Norwich Main substation. The onshore substation will be constructed to accommodate the connection of both SEP and DEP to the transmission grid.

2.1 Construction programme

An indicative construction programme was provided in Plates 4-23, 4-24 and 4-23 of the Project Description chapter [APP-090]. This indicated the anticipated construction timescales for the various elements of the Project. The Applicant has anticipated that the maximum construction duration for the entire Project would be eight years, depending on the construction scenario.

In the event that both SEP and DEP are built, the following principles set out the framework for how SEP and DEP may be constructed:

- SEP and DEP may be constructed at the same time, or at different times;
- If built at the same time both SEP and DEP could be constructed in four years;
- If built at different times, either Project could be built first;
- If built at different times, each Project would require a four year period of construction;
- If built at different times, the offset between the start of construction of the first Project, and the start of construction of the second Project may vary from two to four years;
- Taking the above into account, the total maximum period during which construction could take place is eight years for both Projects.

The earliest offshore construction start date is 2025 with unexploded ordnance (UXO) clearance and geophysical survey pre-dating that.

Onshore works are anticipated to commence no earlier than 2025, with Pre-construction works expected to take place from 2024.

The final offshore construction programme will be submitted to the Marine Management Organisation (MMO) under condition 13 of the generation assets DML and condition 12 of the transmission assets DML in the draft DCO. The construction programme must include details of:

(i) the proposed construction start date;
(ii) proposed timings for mobilisation of plant delivery, materials, and installation works; and
(iii) an indicative written construction programme for all wind turbine generators (WTGs), offshore platforms, and cable comprised in the works in Part 1 (licensed marine activities) of [Schedule 11] (insofar as not shown in paragraph (ii) above), and paragraph 2 of Part 1 (licensed marine activities) of Schedule 12 unless otherwise agreed in writing with the MMO.

The final 'as-built' parameters will be submitted to the MMO under condition 22 of the generation assets DML.

2.2 Project location

The SEP array area lies approximately 15.8km north of North Norfolk coast, at its closest point (Figure 1).

The DEP array area lies approximately 26.5km off the north Norfolk coast, at its closest point (Figure 1).

Across both array areas, the water depths range from 14m to 36m below Lowest Astronomical Tide (LAT). The deepest part of the project area is at DEP North at 36 m below LAT. The seabed gradient across both wind farm sites is generally relatively flat (i.e. less than 1°), although steeper gradients are associated with areas of sand waves, particularly in the northwest of the DEP North and DEP South array areas.

Water depths along the interlink cable corridors are between 10m and 35m. Similar to the array areas, the seabed along the offshore cable corridors is relatively flat. However, there are sand waves at the northern end of the SEP and DEP North array area, in the corridor and between DEP South and DEP North array areas, on the south-west side of Dudgeon Offshore Wind farm.

Water depths along the export cable corridor are between 25m and 27m in the area closest to the SEP wind farm site, shallowing to about 16m near the eastern tip of the Sheringham Shoal sand bank and then decreasing progressively to 0m at the coast.

The predominant surface sediment types across the offshore sites are medium and coarse sands and gravels, and outcropping chalk in the landward 500m of the export cable corridor.

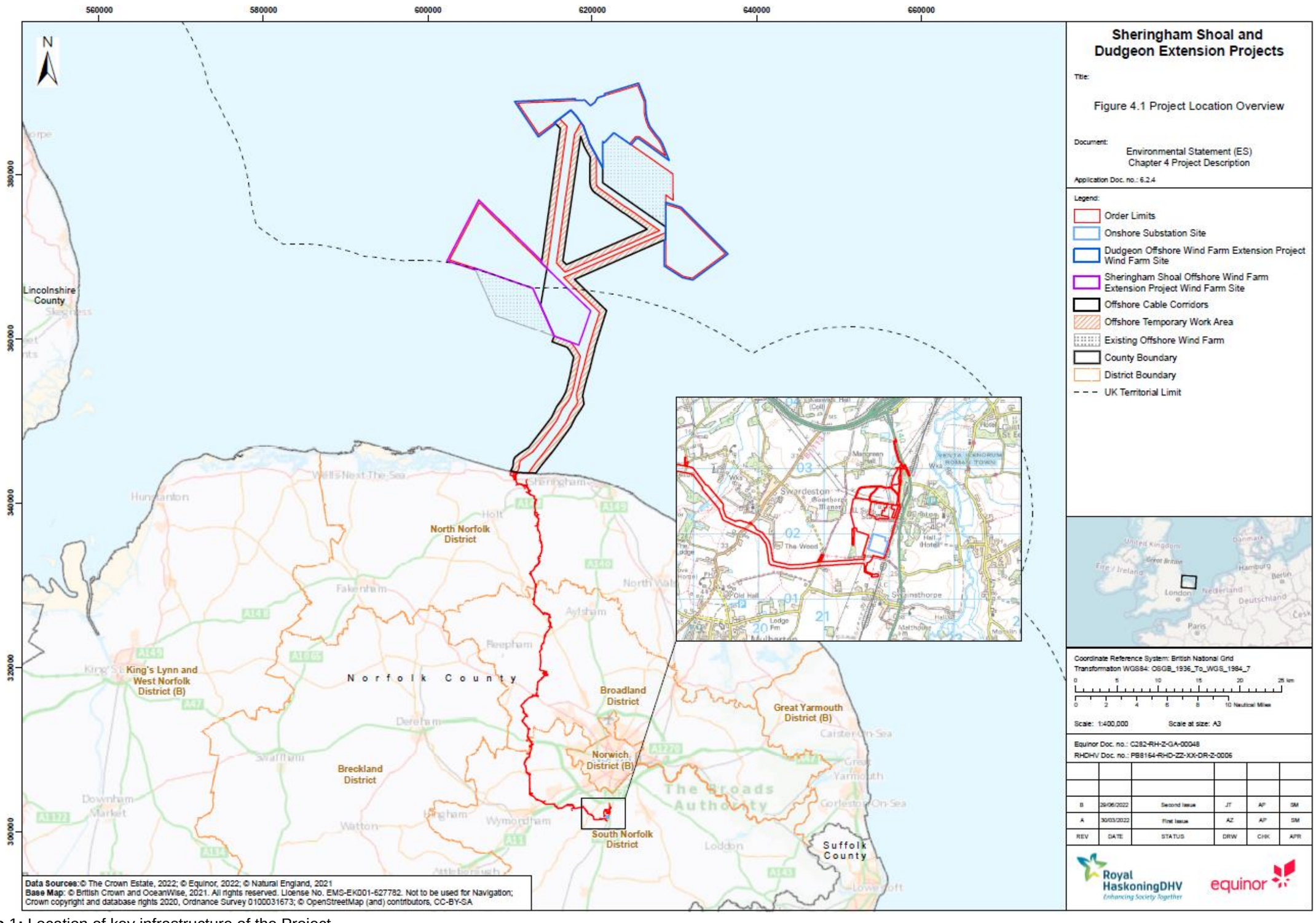

Figure 1**:** Location of key infrastructure of the Project.

2.3 Changes to the Application during Examination and post-Examination

During the Examination, the Applicant submitted two change requests with several proposed changes as reported in Chapter 2 and 4 of the ExA's Recommendation Report. These changes were accepted by the ExA as described in Chapter 4 of this Recommendation Report. The ExA concluded that no relevant HRA matters arose from these change requests [PD-013] [PD-014].

3 Stage 1: Screening for Likely Significant Effects

Under Regulation 63 of the Habitats Regulations and Regulation 28 of the Offshore Habitats Regulations, the Secretary of State must consider whether a development will have a likely significant effect (LSE) on a protected site, either alone or in-combination with other plans or projects.

The purpose of this section is to identify any LSEs on protected sites that may result from the Project and to record the Secretary of State's conclusions on the need for an AA.

Appendix 1 to the RIAA presented the HRA Screening Assessment [APP-060] and Section 2.3 of that document set out in broad terms the approach to screening for LSE.

The spatial relationship between the Order limits of the Project and protected sites is shown on several figures provided within Appendix 1 [APP-060] to the Applicant's RIAA, including: Figure 3-1 (onshore European sites); Figure 4-1 (Annex 1 habitat offshore European sites); Figure 6-5 (marine mammal European sites); and Figure 7-1 (ornithology European sites). Protected sites designated for marine mammal qualifying features that have been carried forward to the consideration of AEoI are also shown on Figure 8.1 of the RIAA [APP-059]. The Applicant provided further figures as Annex 1 to its response at D7 to the RIES [REP7-062] to show all protected sites considered in relation to the Project, including those within European Economic Area (EEA) States.

A complete list of all protected sites and their qualifying features screened in for AA by the applicant, following consultation with NE [RR-063] are presented in Table 1. This includes updates made during Examination that included changes to the following seven designated sites:

- River Wensum SAC;
- Berwickshire and North Northumberland Coast SAC;
- Humber Estuary SAC;
- Southern North Sea SAC;
- Flamborough and Filey Coast SPA;
- Greater Wash SPA;
- North Norfolk Coast SPA.

NE [RR-063] considered additional impact pathways should be screened into the Applicant's assessment, where they had previously been screened out of LSE. These are identified in Table 2-1 of the RIES.

The final list of all protected sites considered by the Applicant for LSE are listed in Table 2-2 of the HRA Screening Matrices [REP4-009]. Those sites and features for which a conclusion of LSE was reached are listed [REP4-011, Table 1].

In addition to those sites identified and agreed, during Examination the ExA concluded that an LSE could not be ruled out for Berwickshire and North Northumberland Coast SAC on the basis that NE subsequently identified that the Project is within the foraging range of this SAC [ER 26.2.30]. Consequently, this site is included within this assessment.

Of all the protected sites identified during Examination, the ExA concluded that LSEs could not be excluded for the following sites and their qualifying features, either alone or in-combination

with other plans or projects, based on the final versions of the Applicant's RIAA and Screening Matrices [APP-059, REP4-009, REP4-011].

SACs

- Humber Estuary SAC
- Inner Dowsing, Race Bank and North Ridge SAC
- River Wensum SAC
- Southern North Sea SAC
- The Wash and North Norfolk Coast SAC
- Moray Firth SAC

SPAs and Ramsar

- Alde-Ore Estuary SPA and Ramsar,
- Auskerry SPA,
- Breydon Water SPA and Ramsar,
- Broadland SPA and Ramsar,
- Coquet Island SPA,
- East Caithness Cliffs SPA,
- East Mainland Coast, Shetland SPA,
- Fair Isle SPA,
- Farne Islands SPA,
- Flamborough and Filey Coast SPA,
- Forth Islands SPA,
- Foula SPA,
- Fowlsheugh SPA,
- Gibraltar Point SPA and Ramsar,
- Greater Wash SPA,
- Hermaness, Saxa Vord and Valla Field SPA.
- Hoy SPA,
- Humber Estuary SPA and Ramsar,
- Imperial Dock Lock, Leith SPA,
- Marwick Head SPA,
- Minsmere-Walberswick SPA and Ramsar,
- Nene Washes SPA and Ramsar,
- North Caithness Cliffs SPA,
- North Norfolk Coast SPA and Ramsar,
- Noss SPA,
- Ouse Washes SPA and Ramsar,
- Outer Thames Estuary SPA,
- Papa Stour SPA,
- Ronas Hill – North Roe and Tingon SPA,
- St Abbs Head to Fast Castle SPA,
- The Wash SPA and Ramsar,
- Troup, Pennan and Lion's Heads SPA,
- West Westray SPA,
- Ythan Estuary, Sands of Forvie and Meikle Loch SPA (and SPA extension) and Ramsar.

Table 1 summarises the features for which significant effects, either alone or in-combination, cannot be excluded for each SAC. Table 2 summarises the features for which significant effects, either alone or in-combination, cannot be ruled out for each SPA and Ramsar site. The RIES and the Applicant's final HRA Report provide further information on sites and features which were considered, but for which LSE were screened out [APP-059].

Table 1: Summary of SACs and qualifying features which likely significant effects cannot be excluded

Name of protected site	Qualifying features	Potential Impact (alone and in-combination)
River Wensum	Watercourses of plain to montane levels with *R. fluitantis* and *Callitricho-Batrachion*	Both direct and indirect effects upon both the features of the site and the supporting habitats.

Name of protected site	Qualifying features	Potential Impact (alone and in-combination)
SAC[14]	vegetation.	
	White-clawed crayfish	Should there be a 'bentonite break out', there could be a release of the drilling fluid into the river.
	Desmoulin's whorl snail	Should there be a 'bentonite break out', there could be a release of the drilling fluid into the river.
	Brook lamprey	Should there be a 'bentonite break out', there could be a release of the drilling fluid into the river.
	Bullhead[15]	Should there be a 'bentonite break out', there could be a release of the drilling fluid into the river.
Inner Dowsing, Race Bank and North Ridge SAC	Sandbanks which are slightly covered by seawater all the time.	Potential effects from changes to bedload sediment transport from only SEP OWF infrastructure (not DEP).
Southern North Sea SAC	Harbour porpoise	• underwater noise, • barrier effects from underwater noise; • vessel interactions; • changes to water quality; • changes to prey availability.
Moray Firth SAC	Bottlenose dolphin	• underwater noise; • barrier effects from underwater noise; • vessel interactions; • changes to water quality; • changes to prey availability.
Humber Estuary SAC	Grey Seal	• underwater noise; • barrier effects from underwater noise; • vessel interactions; • changes to water quality; • changes to prey availability.
The Wash and North Norfolk Coast SAC	Sandbanks which are slightly covered by seawater all the time	Potential effects on sandbanks from changes to bedload sediment transport from cable protection
	Harbour seal	• underwater noise; • barrier effects from underwater noise; • vessel interactions; • disturbance at seal haul-out sites; • disturbance of foraging seals at sea; • changes to water quality; • changes to prey availability.
Berwickshire and North Northumberland Coast SAC	Grey seal	• underwater noise; • barrier effects from underwater noise; • vessel interactions; • changes to water quality; • changes to prey availability.

[14] Following advice from NE and the production of a technical note [REP2-050], white-clawed crayfish, Desmoulin's whorl snail, brook lamprey and bullhead were included in the screening assessment for the River Wensum SAC at Hearing 4 [REP4-009].

Table 2: Summary of SPAs and Ramsar sites, their qualifying features which likely significant effects cannot be excluded

Name of protected site	Qualifying features	Potential Impact (alone and in-combination)
Greater Wash SPA[16]	Sandwich tern[17]	Potential risk of collision effects during the breeding season.
	Common tern	Potential risk of collision during the breeding season.
	Red-throated diver	Potential risk of collision during the non-breeding season.
	Little gull	Potential risk of collision during the non-breeding season.
North Norfolk Coast SPA and Ramsar Site	Sandwich tern - SPA and Ramsar site	Potential risk of collision and displacement/barrier effects during the breeding and non-breeding (spring and autumn migration) seasons.
	Common tern - SPA and Ramsar site	Potential risk of collision and displacement/barrier effects during the breeding and non-breeding (spring and autumn migration) seasons.
	Pink-footed goose - SPA and Ramsar site	Potential risk of collision during migratory flights to and from the site
	Dark-bellied brent goose - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site
	Wigeon - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site
	Knot - SPA and Ramsar site.,	Potential risk of collision during migratory flights to and from the site
	Pintail - Ramsar site,	Potential risk of collision during migratory flights to and from the site
Outer Thames Estuary SPA	Red-throated diver	Potential risk of displacement and barrier effects during the non-breeding season
Breydon Water SPA and Ramsar Site	Bewick's swan - SPA and Ramsar site	Potential risk of collision during migratory flights to and from the site
	Avocet - SPA	Potential risk of collision during migratory flights to and from the site
	Golden plover - SPA,	Potential risk of collision during migratory flights to and from the site
	Lapwing - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site

[16] Note NE advised that common scoter should be included within the screening assessment for the Greater wash SPA [REP3-143]. Following updated screening it was concluded that there would be no LSE on this feature [REP4-009]. This conclusion was agreed with by NE [REP8-102]

[17] Note NE advised that an assessment of the displacement effects on Sandwich tern at the Greater Wash SPA and the North Norfolk Coast SPA and Ramsar site did not need to be considered for assessment [REP2-045].

Name of protected site	Qualifying features	Potential Impact (alone and in-combination)
	Ruff – SPA	Potential risk of collision during migratory flights to and from the site
	Waterbird assemblage - SPA and Ramsar site	Potential risk of collision during migratory flights to and from the site
The Wash SPA and Ramsar Site	Bar-tailed godwit SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site
	Bewick's swan - SPA and Ramsar site	Potential risk of collision during migratory flights to and from the site
	Black-tailed godwit SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site
	Common scoter – SPA	Potential risk of collision during migratory flights to and from the site
	Curlew - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site
	Dark-bellied brent goose - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site
	Dunlin - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site
	Gadwall - SPA,	Potential risk of collision during migratory flights to and from the site
	Goldeneye - SPA,	Potential risk of collision during migratory flights to and from the site
	Golden plover - Ramsar site,	Potential risk of collision during migratory flights to and from the site
	Grey plover - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site
	Knot - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site
	Lapwing - Ramsar site,	Potential risk of collision during migratory flights to and from the site
	Oystercatcher - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site
	Pink-footed goose - - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site
	Pintail – SPA,	Potential risk of collision during migratory flights to and from the site
	Redshank - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site
	Ringed plover - Ramsar site,	Potential risk of collision during migratory flights to and from the site
	Sanderling - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site
	Shelduck - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site

Name of protected site	Qualifying features	Potential Impact (alone and in-combination)
	Turnstone - SPA	Potential risk of collision during migratory flights to and from the site
	Wigeon - - SPA	Potential risk of collision during migratory flights to and from the site
	Waterbird Assemblage, SPA	Potential risk of collision during migratory flights to and from the site.
Gibraltar Point SPA and Ramsar Site	Bar-tailed godwit SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site.
	Dark-bellied brent goose - Ramsar site,	Potential risk of collision during migratory flights to and from the site.
	Grey plover - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site.
	Sanderling - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site.
	Waterbird Assemblage SPA.	Potential risk of collision during migratory flights to and from the site.
Humber Estuary SPA and Ramsar	Avocet SPA	Potential risk of collision during migratory flights to and from the site.
	Bar-tailed godwit SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site.
	Bittern – SPA	Potential risk of collision during migratory flights to and from the site.
	Black-tailed godwit SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site.
	Dunlin - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site.
	Golden plover - Ramsar site,	Potential risk of collision during migratory flights to and from the site.
	Knot - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site.
	Redshank - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site.
	Ruff – SPA	Potential risk of collision during migratory flights to and from the site.
	Shelduck - SPA and Ramsar site,	Potential risk of collision during migratory flights to and from the site.
	Waterbird Assemblage, SPA and Ramsar.	Potential risk of collision during migratory flights to and from the site.
Broadland SPA and Ramsar Site	Bewick's swan - SPA and Ramsar site	Potential risk of collision during migratory flights to and from the site
	Gadwall – SPA and Ramsar,	Potential risk of collision during migratory flights to and from the site
	Ruff – SPA	Potential risk of collision during migratory flights to and from the site.

Name of protected site	Qualifying features	Potential Impact (alone and in-combination)
	Shoveler – SPA and Ramsar,	Potential risk of collision during migratory flights to and from the site
	Whooper swan – SPA,	Potential risk of collision during migratory flights to and from the site
	Wigeon – SPA and Ramsar,	Potential risk of collision during migratory flights to and from the site
Ouse Washes SPA and Ramsar Site	Bewick's swan - SPA and Ramsar site	Potential risk of collision during migratory flights to and from the site
	Black-tailed godwit SPA	Potential risk of collision during migratory flights to and from the site.
	Gadwall – SPA and Ramsar	Potential risk of collision during migratory flights to and from the site
	Garganey SPA,	Potential risk of collision during migratory flights to and from the site.
	Pintail - – SPA and Ramsar	Potential risk of collision during migratory flights to and from the site.
	Pochard – SPA	Potential risk of collision during migratory flights to and from the site.
	Ruff – SPA	Potential risk of collision during migratory flights to and from the site.
	Shoveler – SPA and Ramsar	Potential risk of collision during migratory flights to and from the site
	Teal – SPA and Ramsar	Potential risk of collision during migratory flights to and from the site
	Whooper swan – SPA and Ramsar	Potential risk of collision during migratory flights to and from the site
	Wigeon – SPA and Ramsar	Potential risk of collision during migratory flights to and from the site
	Waterbird Assemblage, SPA and Ramsar.	Potential risk of collision during migratory flights to and from the site.
Minsmere-Walberswick SPA and Ramsar Site	Avocet – SPA	Potential risk of collision during migratory flights to and from the site.
	European white-fronted goose - SPA	Potential risk of collision during migratory flights to and from the site.
	Gadwall – SPA and Ramsar,	Potential risk of collision during migratory flights to and from the site
	Shoveler – SPA	Potential risk of collision during migratory flights to and from the site.
	Teal – SPA and Ramsar,	Potential risk of collision during migratory flights to and from the site
	Breeding bird Assemblage, SPA and Ramsar	Potential risk of collision during migratory flights to and from the site
Nene Washes SPA and Ramsar Site	Bewick's swan – SPA and Ramsar,	Potential risk of collision during migratory flights to and from the site

Name of protected site	Qualifying features	Potential Impact (alone and in-combination)
	Black-tailed godwit SPA and Ramsar site	Potential risk of collision during migratory flights to and from the site
	Shoveler – SPA and Ramsar sites	Potential risk of collision during migratory flights to and from the site.
	Teal – SPA,	Potential risk of collision during migratory flights to and from the site
	Whooper Swan - Ramsar site	Potential risk of collision during migratory flights to and from the site.
	Wigeon – SPA,	Potential risk of collision during migratory flights to and from the site
Alde-Ore Estuary SPA and Ramsar Site	Lesser black-backed gull - SPA and Ramsar site	Potential risk of collision during the breeding and non-breeding (autumn migration, winter and spring migration seasons)
Flamborough and Filey Coast SPA	Kittiwake	Potential risk of collision during the breeding and non-breeding (autumn migration and spring migration) seasons
	Gannet	Potential risk of collision and displacement/barrier effects during the breeding and non-breeding (autumn migration and spring migration) seasons
	Guillemot	Potential risk of displacement/barrier effects during the breeding and non-breeding seasons
	Razorbill	Potential risk of displacement/barrier effects during the breeding and non-breeding (autumn migration, winter and spring migration) seasons.
	Seabird Assemblage[18]	Potential risk of collision and displacement/barrier effects during the breeding and non-breeding (autumn migration and spring migration) seasons
Coquet Island SPA	Sandwich tern	Potential risk of collision and displacement/barrier effects during the non-breeding season (autumn migration and spring migration).
	Common tern	Potential risk of collision during the non-breeding season (autumn migration and spring migration)
	Arctic tern	Potential risk of collision during the non-breeding season (autumn migration and spring migration)
Farne Islands SPA	Arctic tern	Potential risk of collision during the non-breeding season (autumn migration and spring migration)
	Sandwich tern	Potential risk of collision and displacement/barrier effects during the non-breeding season (autumn migration and spring migration).
	Guillemot	Potential risk of displacement/barrier effects during non-breeding seasons.
	Seabird assemblage (including puffin)	Potential risk of collision and/or displacement and barrier effects during the non-breeding season

[18] Following advice from NE [RR-063] the seabird assemblage for the Flamborough and Filey Coast SPA was screened in to the assessment [REP2-037, REP4-009].

Name of protected site	Qualifying features	Potential Impact (alone and in-combination)
		(autumn migration, spring migration and non-breeding season).
St Abbs Head to Fast Castle SPA	Seabird assemblage (guillemot)	Potential risk of displacement during the non-breeding season
Forth Islands SPA	Gannet,	Potential risk of collision and displacement/barrier effects during the non-breeding season (autumn migration and spring migration)
	Lesser black-backed gull,	Potential risk of collision during the non-breeding season (autumn migration, winter and spring migration)
	Puffin,	Potential risk of displacement/barrier effects during the non-breeding season
Imperial Dock Lock, Leith SPA	Common tern	Potential risk of collision during the non-breeding season (autumn migration and spring migration).
Fowlsheugh SPA	Guillemot	Potential risk of displacement/barrier effects during the non-breeding season
	Kittiwake	Potential risk of collision during the non-breeding season (autumn migration and spring migration).
Ythan Estuary, Sands of Forvie and Meikle Loch SPA and Ramsar Site	Sandwich tern	Potential risk of collision and displacement/barrier effects during the non-breeding season (autumn migration and spring migration).
Troup, Pennan and Lion's Heads SPA	Kittiwake	Potential risk of collision during the non-breeding season (autumn migration and spring migration)
	Guillemot	Potential risk of displacement/barrier effects during the non-breeding season.
East Caithness Cliffs SPA	Guillemot	Potential risk of displacement/barrier effects during the non-breeding season.
	Kittiwake	Potential risk of collision during the non-breeding season (autumn migration and spring migration).
	Razorbill	Potential risk of displacement/barrier effects during the non-breeding season (autumn migration, winter and spring migration).
North Caithness Cliffs SPA	Guillemot	Potential risk of displacement/barrier effects during the non-breeding season.
Hoy SPA	Red-throated diver,	Potential risk of displacement/barrier effects during the non-breeding season (autumn migration, winter and spring migration).
Auskerry SPA	Arctic tern	Potential risk of collision during the non-breeding season (autumn migration and spring migration).
Marwick Head SPA	Guillemot	Potential risk of collision during the non-breeding season (autumn migration and spring migration).
West Westray SPA	Guillemot	Potential risk of displacement/barrier effects during the non-breeding season.
Fair Isle SPA	Guillemot	Potential risk of displacement/barrier effects during the non-breeding season. [COLLISION?]

Name of protected site	Qualifying features	Potential Impact (alone and in-combination)
Noss SP	Gannet	Potential risk of collision and displacement/barrier effects during the non-breeding season (autumn migration and spring migration).
	Guillemot	Potential risk of displacement/barrier effects during the non-breeding season.
East Mainland Coast Shetland SPA	Red-throated diver	Potential risk of displacement/barrier effects during the non-breeding season (autumn migration, winter and spring migration).
Foula SPA	Guillemot	Potential risk of displacement/barrier effects during the non-breeding season.
	Puffin	Potential risk of displacement/barrier effects during the non-breeding season
	Red-throated diver	Potential risk of displacement/barrier effects during the non-breeding season (autumn migration, winter and spring migration).
Papa Stour SPA	Arctic tern	Potential risk of collision during the non-breeding season (autumn migration and spring migration).
Ronas Hill – North Roe and Tingon SPA	Red-throated diver	Potential risk of displacement/barrier effects during the non-breeding season (autumn migration, winter and spring migration).
	Great skua	Potential risk of displacement/barrier effects during the autumn migration season.
Hermaness, Saxa Vord and Valla Field SPA	Gannet	Potential risk of collision and displacement/barrier effects during the non-breeding season (autumn migration and spring migration).
	Great skua	Potential risk of collision and displacement/barrier effects during the non-breeding season (autumn migration and spring migration).

NE confirmed its joint position statement with the Applicant [REP7-111] its agreement with the Applicant's conclusions on LSE. The submitted final SoCG (offshore) between the Applicant and NE [REP8-042] also records agreement on the conclusions of the screening assessment.

Protected sites outside of the UK's NSN were considered in the Applicant's screening exercise, however, no potential impacts on sites in EEA were identified. This HRA only addresses protected sites which form part of the UK's NSN.

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

3.1 Likely Significant Effects Alone Assessment

The outcomes of the Applicant's assessment of effects on integrity are provided, and summarised in the RIAA [APP-059, Sections 6 to 10], with the exception of the grey seal qualifying feature of the Berwickshire and North Northumberland Coast SAC, as described above. A total of 31 protected sites in England/English waters and 20 protected sites in Scotland/ Scottish waters were carried forward by the Applicant to consideration of AEoI [APP-059] [REP4-009], as identified in Table 1 and Table 2 above.

The Secretary of State agrees with the recommendations of the ExA and concludes that LSEs cannot be excluded at the sites listed in Table 1 and Table 2, 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

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.

The Applicant applied a 'tiered' approach to the in-combination assessment to reflect the different levels of uncertainty associated with the project design and timeframes for the projects screened into assessment [APP-059]. The allocated 'Tiers' reflect the current stage of the relevant projects within the planning and development process. This allowed the in-combination impact assessment to consider several future development scenarios, each with a differing potential for being ultimately built out. The tiers consisted of:

Tier 1: Built and operational projects should be included within the cumulative assessment where they have not been included within the environmental characterisation survey, i.e. they were not operational when baseline surveys were undertaken, and/or any residual impact may not have yet fed through to and been captured in estimates of "baseline" conditions e.g. background" distribution or mortality rate for birds.

Tier 2: Projects under construction.

Tier 3: Projects that have been consented (but construction has not yet commenced).

Tier 4: Projects that the regulatory body is expecting an application to be submitted for determination (e.g. projects listed under the Planning Inspectorate programme of projects).

Tier 5: Projects that the regulatory body are expecting to be submitted for determination.

Tier 6: projects that have been identified in relevant strategic plans or programmes (e.g. projects identified in Round 3 wind farm ZAP documents)

The Applicant's RIAA [APP-059] identified the projects and plans considered for the in-combination assessment at the AEoI stage and the Screening Matrices [APP-060, APP-062] identify potential in-combination LSE.

in response to the RIES, NE [REP7-111] confirmed that the Applicant has sufficiently addressed its concerns with respect to marine mammals and had no remaining concerns on the matter.

In respect of ornithology, discussions were also held throughout the Examination concerning the other foreseeable projects that the Applicant had/should include in its in-combination modelling and HRA assessments.

NE identified [REP5-091] that several North Sea offshore wind farm projects (as Tier 4 or 5 projects) should be included in the in-combination assessment, where this would be meaningful. These included projects at scoping or Preliminary Environmental Information Report (PEIR) stage, namely: Rampion 2, Five Estuaries, North Falls, Outer Dowsing, Dogger Bank South (two projects) and Dogger Bank D; and the Berwick Bank OWF in Scottish Waters. However having reviewed the information available for these projects, NE considered that the only project for which sufficient data were available to carry out a quantitative assessment of impacts at the time of the Projects DCO submission was Rampion 2. Although even then, limited confidence could be placed on the impact assessment values as they had not been subject to detailed consultation.

NE confirmed that the Applicant had considered all appropriate sets of plans and projects at this stage, as data for the aforementioned projects were not available until after the end of Examination.

Data from Berwick Bank offshore wind farm were available and had been incorporated into submissions from HP4. The additional data from Berwick Bank would not affect the AEoI judgements NE has provided.

The ExA was content that the Applicant had undertaken a thorough assessment of potential cumulative effects and that appropriate information has been included from all known and identified plans and projects. Furthermore the ExA recognised that the list of projects taken into account by the Applicant fulfilled the expectations of the Planning Inspectorate's Advice Note 17 (AN17). [ER 7.4.35]

The Secretary of State agrees with the recommendations of the ExA and concludes that LSEs cannot be excluded at the protected sites listed in Table 1 and Table 2 when the impacts of the Project are considered in-combination with other plans or projects. The protected sites listed in Table 1 and Table 2 are taken forward to the AA to consider whether the Project in-combination with other plans or projects will result in an AEoI of these sites.

4 Appropriate Assessment

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[19].

In line with the requirements of Regulation 63 of the Habitats Regulations and Regulation 28 of the Offshore Habitats Regulations:

In considering whether a plan or project will adversely affect the integrity of the site, the competent authority must have regard to the manner in which it is proposed to be carried out or to any conditions or restrictions subject to which it proposes that the consent, permission or other authorisation should be given.

The purpose of this AA is to determine whether adverse effects on the integrity of the features of the protected 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.

In accordance with the precautionary principle embedded in the integrity test and established through case law[20], the Secretary of State as the competent authority may agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the protected site, and this must be demonstrated beyond all reasonable scientific doubt. If the Secretary of State cannot exclude adverse effects on integrity (AEoI) of the affected protected sites, then he can only agree to a plan or project if it complies with the requirements of Regulation 64 of the Habitats Regulations. Regulation 64 provides that the Secretary of State may agree to the plan or project only if satisfied that there are no alternative solutions, and that the plan or project must be carried out for imperative reasons of overriding public interest (IROPI). In addition, Regulation 68 requires compensatory measures to be secured which maintain the overall coherence of the NSN.

The Secretary of State has undertaken an objective scientific assessment of the implications of the Project on the qualifying features of the protected sites identified in the screening assessment, using best scientific evidence available. The assessment considers the site's conservation objectives, which are set out in Section 1.3 and subsequent sections of this HRA Report.

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

[20] CJEU Case C-127/02 Waddenzee 7 September 2004, Reference for a preliminary ruling from the Raad van State (Netherlands) in the proceedings: Landelijke Vereniging tot Behoud van de Waddenzee and Nederlandse Vereniging tot Bescherming van Vogels v Staatssecretaris van Landbouw, Natuurbeheer en Visserij.

The RIAA submitted with the application for the Project [APP-059] concluded that the Project could result in an AEoI on the following protected site and qualifying features.

- Greater Wash SPA: in-combination effects of collision impacts on Sandwich tern and combined in-combination impacts from collision and displacement on Sandwich tern.
- North Norfolk Coast SPA: in-combination effects of collision impacts on Sandwich tern and combined in-combination impacts from collision and displacement on Sandwich tern.
- Flamborough and Filey Coast SPA: in-combination effects of collision impacts on kittiwake.

Following discussions with stakeholders during Examination, the RIAA screening assessment was subsequently updated [REP04-009]. The revised RIAA included:

- Flamborough and Filey Coast SPA: Seabird Assemblage screened in.
- Outer Thames Estuary SPA: In-combination effects from displacement caused by vessel traffic.
- Greater Wash SPA and North Norfolk Coast SPA: The removal of displacement effects on Sandwich terns.
- Greater Wash SPA: inclusion of common scoter.
- Moray Firth SAC: Included for disturbance/displacement effects on bottlenose dolphins.
- River Wensum SAC: inclusion of additional features due to impacts arising from, white-clawed crayfish, brook lamprey and bullhead.
- Broadland Ramsar: screened out of any further assessment.

4.1 Subtidal and intertidal benthic ecology

The RIAA [APP-059] and associated Appendices [APP-060 and APP-061] assessed the LSE pathways on subtidal and intertidal benthic qualifying features of protected sites from the Project alone and in-combination, respectively. Impacts were assessed for the:

- Inner Dowsing, Race Bank and North Ridge SAC;
- The Wash and North Norfolk Coast SAC.

4.1.1 Appropriate Assessment: Inner Dowsing, Race Bank and North Ridge SAC.

The Inner Dowsing, Race Bank and North Ridge SAC covers an area of approximately 845km^2 and is located off the south Lincolnshire coast in the vicinity of Skegness, extending eastwards and north from Burnham Flats on the North Norfolk coast, occupying The Wash Approaches. At the closest point, the boundary of the SEP wind farm site is approximately 2.2km east of the SAC (and the DEP North array area is approximately 10.3km to the east).

The area encompasses a wide range of sandbank types (banks bordering channels, linear relict banks, sinusoidal banks with distinctive ‘comb-like’ subsidiary banks) and biogenic reef of the worm *Sabellaria spinulosa*.

The following Annex I habitats are qualifying features of the Inner Dowsing, Race Bank and North Ridge SAC:

- Sandbanks which are slightly covered by sea water all the time,
- Reefs.

The Secretary of State has considered the potential for the Project to constitute an adverse effect on site integrity for each feature for which a significant effect is likely. A LSE upon the Sandbanks which are slightly covered by sea water all the time 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 feature via:

- Increased Seabed Sediment Concentration (SSC) and deposition during construction, operation and decommissioning; and
- Changes to physical processes resulting in changes to sediment supply (i.e. sediment transport effects) during operation, but in relation to the SEP wind farm site only.

The Applicant concluded that the Project alone or in-combination would not result in an AEoI of Inner Dowsing, Race Bank and North Ridge SAC on the basis of:

- The impact of increased SSC entering the Inner Dowsing, Race Bank and North Ridge SAC and subsequent deposition is expected to be negligible with all subtidal sand biotopes determined to be low or not sensitive.
- Net sediment transport is moving away from the Inner Dowsing, Race Bank and North Ridge SAC, and across the SEP and DEP wind farm sites, meaning there will be no interruption of sediment supply to the Annex I sandbanks of the Inner Dowsing, Race Bank and North Ridge SAC, which will be supplied by sediment further up the coast from the north-west.
- There is no pathway for in-combination impacts in relation to wind turbine foundation installation or cable installation.

During Examination NE advised that further evidence be provided to support the Applicant's conclusion [RR-063]. This was in respect of the impact pathways: increased SSC and deposition and changes in physical processes (affecting sediment supply).

The Applicant addressed these comments [REP3-093 and REP3-107] and NE confirmed that it agreed with the Applicant's conclusion of no AEoI to this SAC and qualifying feature [REP3-093].

The ExA was satisfied that the Project alone or in-combination would not affect the ability of the protected site to achieve its conservation objectives [ER 26.6.6].

The ExA had no substantive reasons or reasoning to disagree with the joint positions of the Applicant and the ANCB. The ExA agreed with the joint conclusions reached that an AEoI could be ruled out for the above site.

The Secretary of States conclusions are presented in Table 3.

4.1.2 Appropriate Assessment: The Wash and North Norfolk Coast SAC

This assessment addresses the potential impacts on Annex I habitat features of this site. Other features, namely harbour seal and otter are addressed in Section 4.2.4.1.

The Wash and North Norfolk Coast SAC covers an area of 1,078km^2 and contains a number of habitats and species. At the closest point, the boundary of the SEP and DEP offshore export cable corridor is 1.26km east of the SAC.

With regards to Annex 1 Habitats the site is designated under article 4(4) of the Habitats Directive (92/43/EEC) as it hosts the following qualifying habitats:

- Atlantic salt meadows *Glauco-Puccinellietalia* maritimae;
- Coastal lagoons;
- Large shallow inlets and bays;
- Mediterranean and thermo-Atlantic *halophilous* scrubs *Sarcocornetea fruticosi*.
- (Mediterranean saltmarsh scrub);
- Mudflats and sandflats not covered by seawater at low tide (Intertidal mudflats and sandflats);
- Reefs;
- Salicornia and other annuals colonising mud and sand (Glasswort and other annuals colonising mud and sand); and
- Sandbanks which are slightly covered by sea water all the time (Subtidal sandbanks).

The Secretary of State has considered the potential for the Project to constitute an adverse effect on site integrity for each feature for which a significant effect is likely. A LSE upon the Sandbanks which are slightly covered by sea water all the time 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 feature via:

- Changes to tidal currents affecting sediment transport during the operational phase, from the installation of external export cable protection.

The Applicant concluded that the Project alone or in-combination would not result in an AEoI of the Wash and North Norfolk Coast SAC on the basis of:

- Impacts on bedload sediment transport on the Wash and North Norfolk Coast SAC Annex I sandbanks are likely to be localised to the areas immediately surrounding the cable protection in the form of sea bed scour where the sediment is soft enough to be mobilised. Where the export cables are buried there would be no effect on bedload sediment transport.
- In the unlikely event that there were interruptions to sediment supply to the Wash and North Norfolk Coast SAC Annex I sandbanks, they would be small scale, localised and temporary.
- As there will be no impact to the subtidal sandbanks of the Wash and North Norfolk Coast SAC from potential changes to physical processes due to external export cable protection, there is no impact pathway for in-combination effects with other projects and plans.

Following NE's comments on marine processes the Applicant has presented the zone of potential influence on the tidal regime in the context of marine protected areas, including the SACs [REP2-062, REP3-093]. Following receipt of this information, NE has confirmed that it agrees with the Applicant's conclusion of no AEoI [REP7-066, REP8-107].

The ExA was satisfied that the Project alone or in-combination would not affect the ability of any of the protected site to achieve its conservation objectives [ER 26.6.11].

The ExA had no substantive reasons or reasoning to disagree with the joint positions of the Applicant and NE. The ExA agrees with the joint conclusions reached that an AEoI could be ruled out for the above site.

The Secretary of States conclusions are presented in Table 3.

4.2 Marine mammals

The RIAA [APP-059] and associated Appendices [APP-060 and APP-061] assessed the LSE pathways on marine mammal qualifying features of protected sites from the Project alone and in-combination, respectively. Impacts were assessed for the:

- Southern North Sea SAC – Harbour porpoise;
- Moray Firth SAC – Bottlenose dolphin;
- Humber Estuary SAC and Ramsar – Grey seal;
- The Wash and North Norfolk Coast SAC – Harbour seal;
- Berwickshire and North Northumberland Coast SAC – Grey seal.

The Applicant concluded that the Project alone or in-combination would not result in an AEoI of any of the above protected sites.

4.2.1 Appropriate Assessment: Southern North Sea SAC

The Southern North Sea SAC was designated on 26 February 2019 for harbour porpoise. The site is located to the east of England and stretches from the central North Sea (north of Dogger Bank) to the Straits of Dover in the south, covering an area of approximately 36,951km^2.

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

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

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

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

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

The Applicant concluded that the Project alone or in-combination would not result in an AEoI of Southern North Sea SAC on the basis of:

- The onset of a permanent threshold shift (PTS) is predicted to arise over an area of 260km^2 for simultaneous piling at SEP and DEP. This area of impact would not directly overlap with the SNS SAC winter or summer areas.
- Disturbance of harbour porpoise would not exceed 20% of the seasonal component of the SNS SAC summer or winter area on any given day during piling at SEP and DEP, based on the worst-case scenario.
- Less than 10% of the seasonal component of the SNS SAC over the duration of a season could be affected during piling at SEP and DEP, based on the worst-case scenario
- There is no potential for any direct overlap with the SNS SAC for underwater noise from other construction activities.
- Behavioural response from vessel activities is predicted to be displacement from the area. It is predicted that harbour porpoise will return once the activity has been completed and therefore any impacts from underwater noise as a result of construction vessels will be both localised and temporary.
- It is considered highly unlikely that potential reductions in prey availability as a result of construction activities at SEP and DEP would result in detectable changes to harbour porpoise populations.
- There is no potential for any physical disturbance and loss of seabed habitat in the SNS SAC and there is no potential changes to prey availability as a result of increased SSC and sediment deposition within the SAC.
- Contaminants within the SEP and DEP offshore sites are very low and do not contain elevated levels to cause concern. Any potential changes to prey availability as a result of re-mobilisation of contaminated sediments is assessed as negligible.
- The array sites and cable corridor for SEP and DEP are outside the SAC and therefore there will be no direct effect on the spatial or seasonal components of the SNS SAC from any changes in water quality.

These conclusions were supported by project mitigation measures detailed in Table 8-11 and 8-12 of the RIAA [REP-059] and the Applicant's Schedule of Mitigation and Mitigation Routemap [REP8-021], which included the following embedded mitigation:

- Each piling event would commence with a soft- start at a lower hammer energy followed, by a gradual ramp-up for at least 20 minutes to the maximum hammer energy required (part of Marine Mammal Mitigation Protocol (MMMP) for Piling Activities [REP1-013])
- Establishment of a Mitigation Zone around the pile location before each pile driving activity, based on the maximum predicted distance for PTS.
- Best practice to reduce vessel collision. Embedded mitigation to reduce vessel collision risk with marine mammals includes that vessel movements, where possible, will follow set vessel routes and hence areas where marine mammals are accustomed to vessels, in order to reduce any increased collision risk. All vessel movements will be kept to the minimum number that is required to reduce any potential collision risk.
- Best practice to reduce risk of pollution event. The Applicant is committed to the use of best practice techniques and due diligence regarding the potential for pollution throughout all construction, operation and maintenance, and decommissioning activities [REP3-060].

And the production of the following plans:

- MMMP for pile-driving - activities [REP1-013].
- MMMP for UXO clearance activities.

- Code of conduct for vessel operators will be produced and issued to reduce the risk of collision with marine mammals across all phases of the Projects.
- A Site Integrity Plan (SIP) for the SNS Special Area of Conservation (SAC) will be developed. The SIP will set out the approach to deliver any project mitigation or management measures to reduce the potential for any significant disturbance of harbour porpoise in relation to the SNS SAC conservation objectives.

4.2.1.1 Southern North Sea SAC – Alone effects

The final SoCG between the Applicant and NE [REP8-042] confirmed NE's agreement with the Applicant's conclusion of no AEoI from the Project alone for Southern North Sea SAC and qualifying features considered in the assessment.

The ExA was satisfied that matters relating to alone underwater noise impacts on harbour porpoise of the Southern North Sea SAC were resolved during the Examination [ER 26.7.3]. The ExA was satisfied that the Project alone would not affect the achievement of Southern North Sea SAC conservation objectives for harbour porpoise qualifying features.

4.2.1.2 Southern North Sea SAC – In-combination effects

The Applicant presented in the RIAA [APP-059] that 12.0% of the winter area of the SNS SAC could be subject to noise disturbance in an in-combination scenario over the winter season. This is in exceedance of the 10% threshold for significant disturbance over a season.

Concerns regarding the approach to the assessment and the potential for in-combination noise impacts on harbour porpoise of the Southern North Sea SAC specifically, were discussed during Examination. NE [RR-063, Point 84] [REP3-146] raised concerns that the seasonal averages presented by the Applicant in its RIAA [APP-059]. NE advised the Applicant to present an assessment of the disturbance due to piling across the whole season. NE stated this should be applied to all seasonal assessments undertaken but is of particular importance to the in-combination assessment. The Applicant [REP3-115] confirmed that the assessment as presented in the RIAA had been updated to reflect the noisy days for all activities throughout the full relevant season. NE [REP5-089, REP5-093] acknowledged the updated assessment and stated the updated in-combination assessment of seasonal disturbance to the SAC shows an increased maximum and average in-combination overlap with the summer and winter area, with all scenarios exceeding the threshold.

The SoCG [REP8-042] records that NE agrees with the Applicant's conclusion of no AEoI in-combination from the Project on any marine mammal features of protected sites, but it cannot conclude no AEoI in-combination with plans or projects due to impacts on harbour porpoise of the Southern North Sea SAC in respect of the following impact pathways:

- potential in-combination disturbance effects due to underwater noise from piling at other OWF;
- potential in-combination disturbance effects due to underwater noise sources, other than piling; and
- overall in-combination disturbance effects from all noise sources.

The reason for this arises from NE's position on the SIP and the effectiveness of multiple SIPs to reduce the risk to harbour porpoise within the Southern North Sea SAC.

Concerning the in-combination assessment with other OWFs and geophysical and seismic surveys, NE confirmed the Applicant had sufficiently addressed its concerns [REP7-111, REP8-107]. However, NE disagreed with the Applicant that measures in the SIP would mitigate disturbance from in-combination construction noise. NE expressed concerns around the SIP process and considered that the Applicant should commit to mitigation now in-principle, to reduce impacts and therefore the potential for AEoI in-combination [RR-063, REP3-146]. The Applicant provided a number of mitigation measures and management options within the In-Principle SIP [APP-290], it maintained that it is not appropriate at this stage to determine which of those would be required at the time of SEP and DEP undertake piling and that this is the standard approach. The Applicant [REP3-115] stated that with the development of project-specific SIPs to deliver the appropriate mitigation and management measures across projects and management by the MMO, there would be no significant disturbance and no AEoI of the SNS SAC in relation to the conservation objectives for harbour porpoise as a result of SEP and DEP in-combination with other plans and projects. The Applicant stated [REP3-115] that as both SEP and DEP are located outside of the SAC summer and winter areas, there is the potential for several options to reduce the potential contribution to the underwater noise in-combination effects, for example: scheduling of piling based on specific locations within the Project sites to avoid maximum overlap with seasonal areas, for example, piling at a location which could have potential overlap with the winter area during the summer period.

NE [REP5-093] noted that the Applicant has referred to a potential mitigation measure, namely, to undertake piling outside the relevant season and area of the SAC. NE strongly advised that the Applicant commit to a mitigation measure such as this now, as this would reduce the risk to the Project compared to delaying consideration of mitigation much closer to construction. NE commented that such a commitment would need to be secured through an appropriate condition or within outline mitigation documentation. NE [REP5-094] in its response to the ExA's WQ3 [PD-017] stated that its confidence in the SIP process could be increased through greater regulatory control. NE explained that from its experience to date, HRAs on submitted SIPs are not carried out by the MMO. It considered that this would provide a further element of regulatory scrutiny and potentially identify additional mitigation. NE commented that alternative options could also be considered in the future, for example a cross-regulator AA prior to the relevant season of the SAC, which identifies all projects that will occur in the season and demonstrates that AEoI will not occur, with additional controls (where appropriate) placed on projects that submit applications for that relevant season but after the AA has been undertaken. However, NE recognised that the above is not in the gift of the Applicant.

The Applicant [REP7-062] [REP8-042] maintained throughout the Examination that the SIP is the required and appropriate approach to manage disturbance within the SAC, and therefore this is the approach the Project must take. The Applicant reiterated that although the currently expected in-combination scenario shows exceedance of both the spatial (20%) and seasonal (10%) thresholds, this is based on a precautionary approach to determining the projects that are likely to be undertaking activities at the same time. The Applicant stated it is expected that the in-combination scenario that has been assessed will change significantly before piling at the Project is undertaken. Therefore, the Applicant considers that the assessments provided within the final SIP will be significantly different (i.e., improved/ impacts reduced) to those stated in

[REP3-115]. Although the Applicant provided a number of mitigation measures and management options within the In-Principle SIP [APP-290], it maintains that it is not appropriate at this stage to determine which of those would be required at the time of the Project undertaking piling, and that this is the standard approach.

The Applicant considers the objections by NE are not necessarily specific to the Project, but more a general concern about management and implementation of multiple SIPs from multiple projects [REP8-067, RIESQ17]. The Applicant also observes that the Secretary of State's decision on Hornsea Project 4 (HP4) confirms that the SIP remains the appropriate means of mitigating disturbance effects, thus supporting the Applicant's position on this matter [REP8-052]. Condition 14 of Schedule 10 and 11 and condition 13 of Schedule 12 and 13 of the DCO secures that no piling activities can take place until 6 months after SIP has been submitted to, and approved in writing, by the MMO in consultation with the relevant SNCB. The SIP must accord with the principles set out in the in-principle SIP [APP-290].

NE's position regarding the implementation of SIPs was maintained until the close of Examination, with NE [REP8-042] stating that it had outstanding concerns with the conclusion of no AEoI in-combination due to effectiveness of the SIP process in the post-consent phase.

The MMO considered [REP3-133] that the Applicant's SIP provided sufficient control over the timing and nature of noisy activities to ensure that the relevant in-combination disturbance impact thresholds for marine mammals would not be breached. However, NE expressed concerns about how the potential noise issues would be managed if multiple offshore construction projects were being constructed simultaneously. NE stated they had no confidence in the SIP process for several reasons, concluding that mitigation measures should be committed to now in principle, with the final SIP used to discount mitigation measures that are no longer needed [REP3-147, Q2.12.2.1]. Until the mechanism by which the SIPs will be managed, monitored and reviewed is developed, NE stated it is unable to advise that the Applicant's approach is sufficient to address the cumulative impacts. Consequently, NE could not fully rule out the risk of an AEoI on the SNS SAC. NE maintained this position at the end of the Examination [REP8-108]. appropriate and effective marine mammal mitigation based on the best available information and guidance at that time [REP4-031] [REP5-049].

The ExA noted [ER26.7.32] that NE's outstanding concerns in respect of in-combination noise impacts related to mechanisms for strategic regulatory control, rather than further actions required by the Applicant. The ExA acknowledged the MMO's confidence in the process and considers that it has been provided with sufficient assurance that all plans or projects will be taken into account when the final SIP is submitted. Furthermore, the ExA was aware that the Secretary of State has been satisfied with the approach on recently consented offshore wind farms, including the East Anglia ONE North and East Anglia TWO and HP4 Offshore Wind Farms. The ExA was content that there would be no AEoI Southern North Sea SAC on harbour porpoise qualifying feature from the Project in combination with other plans or projects.

The Secretary of States conclusions are presented in Table 3. The Secretary of State notes her acceptance of the SIP as an appropriate mechanism to avoid and mitigate in-combination noise effects for previous Offshore Wind developments, but that this does preclude her from reaching a different view on subsequent developments. In this instance, the Secretary of State notes the concerns of NE regarding the SIP, but she agrees with the Applicant and MMO that the measures within the in-principle SIP are appropriate and the SIP provides sufficient control over the timing

and nature of noisy activities to ensure that the relevant in-combination disturbance impact thresholds for marine mammals would not be breached.

4.2.2 Appropriate Assessment: Moray Firth SAC

The Moray Firth SAC was designated in 2005 and bottlenose dolphin are a qualifying feature. The Moray Firth SAC extends from the inner firths to Helmsdale on the north coast and Lossiemouth on the south coast and covers an area of 1,510km^2. The closest point to both the SEP and DEP offshore site is more than 600km from the Moray Firth SAC.

An LSE from the Project on the Moray Firth SAC was initially screened out by the Applicant when undertaking HRA screening. It was subsequently concluded that an LSE could not be ruled out by the ExA in the RIES [PD-020] and by the Applicant (APP-059] due to the presence of bottlenose dolphin along the north-east coast of England, and on a precautionary basis, it was assumed that bottlenose dolphin off the east coast of England could be from the Moray Firth SAC.

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

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

The Applicant concluded that the Project alone or in-combination would not result in an AEoI of Moray Firth SAC on the basis of:

- There is no potential for any direct overlap with the Moray Firth SAC
- The onset of a PTS is predicted to arise over an area of 0.01km^2 and impact an estimated 0.0003 individuals.
- Disturbance, based on temporary threshold shift (TTS), is predicted to arise over an area of 0.44km^2 and impact an estimated 0.013 individuals.
- The potential effects that could result from underwater noise during other construction activities, including cable laying and protection would be temporary in nature, not consistent throughout the offshore construction periods for SEP and DEP and would be limited to only part of the overall construction period and area at any one time.
- Behavioural response from vessel activities is predicted to be displacement from the area. It is predicted that bottlenose dolphin will return once the activity has been completed and therefore any impacts from underwater noise as a result of construction vessels will be both localised and temporary.
- Vessel movements, where possible, will be incorporated into recognised vessel routes and hence to areas where marine mammals are accustomed to vessels, in order to reduce any increased collision risk.
- Any potential changes to water quality during construction of SEP and DEP would be negligible.

- It is considered highly unlikely that potential reductions in prey availability as a result of construction activities at SEP and DEP would result in detectable changes to bottlenose dolphin populations.

These conclusions were supported by project mitigation measures detailed in Table 8-11 and 8-12 of the RIAA [APP-059] which included the following embedded mitigation:

- Soft-start and ramp-up (part of MMMP) for Piling Activities),
- Best practice to reduce vessel collision risk,
- Best practice to reduce risk of pollution event.

And the production of the following plans:

- MMMP for pile-driving activities;
- MMMP for UXO clearance activities;
- Southern North Sea SAC SIP.

4.2.2.1 The Moray Firth SAC – Alone and in-combination effects

NE [REP8-104] confirmed that the population parameters are appropriate given the MU being assessed (Greater North Sea) and the reference population size [REP7-056, Table 6-8] is based on the latest information. NE confirmed that the population modelling is sufficient for it to agree with the Applicant's conclusion of no significant impact on bottlenose dolphin from the project alone or cumulatively with other OWFs (in Environmental Impact Assessment (EIA) terms). The joint position statement and the final SoCG between the Applicant and NE [REP7-066] [REP8-042] records agreement of no AEoI from the Project alone or in-combination for this SAC and its qualifying feature.

The ExA [PD-017] [PD-020] sought the view of NatureScot, as the SNCB for this protected site; however, no response was received during the Examination. The ExA is however aware that the Applicant reports positive pre-application engagement with NatureScot and no issues raised in a meeting in November 2022 [REP7-062]. No specific concerns were raised by IPs concerning this SAC beyond the points raised by NE. The ExA does however note that the joint position statement and the final SoCG between the Applicant and NE [REP7-066] [REP8-042] records agreement of no AEoI from the Project alone or in-combination for this SAC and its qualifying feature.

In the absence of views from NatureScot but in the comfort of advice from NE (albeit largely in an EIA context) and considering the information provided to inform an assessment of AEoI to the bottlenose dolphin qualifying feature of the Moray Firth SAC, the ExA agrees with the Applicant's conclusion of no AEoI either alone or in-combination with plans or projects [ER 26.7.37].

The Secretary of States conclusions are presented in Table 3.

4.2.3 Humber Estuary SAC

The Humber Estuary SAC covers an area of 36,657.15ha. The site contains the second largest coastal plain estuary in the UK and the largest coastal plain estuary on the east coast of Britain. The site lies approximately 62.2km from DEP and 59.7km from SEP and 77.1km from the export

cable corridors, at the closest point. Therefore, there is no direct overlap with the Humber Estuary SAC.

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

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

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

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

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

- Underwater noise (including piling, other construction activities, vessels, operational turbines, O&M activities and decommissioning activities);
- Any barrier effects from underwater noise;
- Any increased collision risk with vessels;
- Disturbance at seal haul-out sites;
- Disturbance of foraging seals at sea;
- Changes to water quality;
- Changes to prey availability;
- In-combination effects.

The Applicant concluded [APP-059] that the Project alone or in-combination would not result in an AEoI of Humber Estuary SAC on the basis of:

- There is no potential for any direct overlap with the Humber Estuary SAC.
- At SEP the onset of PTS arising from construction pile-driving noise is predicted to arise over an area of 0.84km^2 and impact an estimated 0.72 individuals. At DEP the onset of PTS is predicted to arise over an area of 1.44km^2 and impact an estimated 1.03 individuals. The area of within which the onset of PTS is predicted to occur increases to 33km^2 should simultaneous pile-driving occur between SEP and DEP and impact 24.3 individuals at SEP and DEP.
- At SEP disturbance arising from construction pile-driving noise, based on TTS, is predicted to arise over an area of 140km^2 and impact an estimated 119.4 individuals. At DEP disturbance is predicted to arise over an area of 220km^2 and impact 162.6 individuals. The area of within which disturbance is predicted to occur increases to 520km^2 should simultaneous pile-driving occur between SEP and DEP and impact 382 individuals at SEP and DEP.

- The effective implementation of the MMMP for piling would reduce the risk of PTS and TTS for grey seal during piling at SEP and DEP.
- Noise arising from other construction activities, including vessels, is lower than that produced from pile-driving and will be both localised and temporary. Therefore, there would be no significant disturbance of grey seal.
- Barrier effects have the potential to prevent movement of grey seal between feeding and/or breeding areas, or potentially increasing swimming distances if grey seal avoid the site and go around it. Disturbance and any barrier effects during piling would be temporary and for a relatively short duration (i.e. during active piling). It is unlikely that all grey seal potentially affected would be from the Humber Estuary SAC, which is located over 59km from SEP and DEP (at the closest point). Therefore, there would be no significant disturbance of grey seal.
- There will be an increase in vessel traffic within and on transit to the offshore sites during all phases of the Project. Vessels would follow an established shipping route to and from the relevant ports in order to minimise vessel traffic in the wider area. vessel movements will be kept to the minimum number and vessel operators will use good practice to reduce any risk of collisions with marine mammals.
- Potential disturbance to seals at haul out sites will not occur at the SEP and DEP Project locations. Vessel movements to and from any port will be incorporated within existing vessel routes, and would therefore be considerably further from the Donna Nook haul-out site than the 300m that is noted as being the distance at which grey seal will react to vessel presence. The additional vessels using these existing vessel routes while transiting to port would not make a significant increase in the potential for disturbance at grey seal haul-out sites.
- Foraging grey seals have the potential to be disturbed due to underwater noise generating activities, and due to the increased presence of vessels at SEP and DEP, and in the vicinity of the vessel transit route from the construction port to SEP and DEP. It is however unlikely that there would be the potential for any significant disturbance of foraging grey seal from the Humber Estuary SAC, given the distance of 59.7km from the closest point of SEP and DEP to the SAC, and that grey seal are generalist feeders with wide foraging ranges. Any disturbance of foraging grey seals would be restricted to the area and duration of the activity, and there are other suitable habitats and prey available in the surrounding area.
- Any potential changes to water quality during construction of SEP and DEP would be negligible.
- Grey seal feed on a variety of prey species and are considered to be opportunistic feeders, feeding on a wide range of prey species and have relatively large foraging ranges. The potential impacts of physical disturbance, temporary habitat loss, increased SSC, re-mobilisation of contaminated sediment on changes in prey availability are localised and short in duration. Noise arising from construction pile-driving is highly unlikely to cause significant changes to prey over the entire area impacted. It is more likely that effects would be restricted to an area around the working sites, and the potential areas for habitat loss. Mitigation to reduce the potential impacts of underwater noise for marine mammals would also reduce the potential impacts on prey species.

These conclusions were supported by project mitigation measures detailed in Table 8-11 and 8-12 of the RIAA [REP-059] which included the following embedded mitigation:

- Soft-start and ramp-up (part of MMMP) for Piling Activities).
- Best practice to reduce vessel collision risk.

- Best practice to reduce risk of pollution event.

And the production of the following plans:

- MMMP for pile-driving activities;
- MMMP for UXO clearance activities;
- Southern North Sea SAC SIP.

4.2.3.1 The Humber Estuary SAC – Alone and in-combination effects

During the Examination, queries were raised by NE and the MMO regarding the baseline and reference population, assessment methodology and pathways of effects to this SAC and its grey seal qualifying feature. These were noted in the RIES [PD-020].

The RIES [PD-020] identified several matters that had been raised by NE in the Examination. This included potential impacts to functionally linked habitat of seal SACs, which NE considered should be considered for LSE. NE [REP7-111] subsequently confirmed that whilst it considered this effect should be considered for LSE, it was content that there would be no AEoI from this pathway. NE [RR-063] [REP1-138] [REP2-064] [REP3-146] also requested the Applicant provide an updated assessment of barrier effects. This was provided and NE subsequently confirmed that the Applicant had provided an updated assessment of barrier effects that provides part of the requested information and that it is content that there would be no AEoI from this pathway [REP3-115]. NE [REP7-111].

These two matters also applied to the harbour seal qualifying feature of The Wash and North Norfolk Coast SAC

The joint position statement and the final SoCG between the Applicant and NE [REP8-042] records agreement of no AEoI from the Project alone or in-combination for this SAC and its qualifying features.

Considering the information provided to inform an assessment of AEoI to the grey seal qualifying feature of the Humber Estuary SAC, and that the MMO are comfortable with coordinating and enforcing the provisions of the MMMP secured through the DCO, can be ruled out both for project alone and in-combination scenarios, the ExA concurred with the Applicant's conclusion of no AEoI either alone or in-combination with plans or projects [ER 26.7.46].

The Secretary of State's conclusions are presented in Table 3.

4.2.4 The Wash and North Norfolk Coast SAC

The Wash and North Norfolk Coast SAC covers an area of approximately 1,078 km^2. It comprises a range of coastal, intertidal and marine habitats extending along the Lincolnshire and Norfolk coastlines. It has extensive areas of varying, but predominantly sandy, sediments subject to a range of conditions. The SAC is is approximately 24.3km from DEP, 8.3km from SEP and 1.3km from the export cable corridors, at the closest point. Therefore, there is the potential for direct overlap with the Wash and North Norfolk Coast SAC.

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

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

- Underwater noise (including piling, other construction activities, vessels, operational turbines, Operation and maintenance activities and decommissioning activities).
- Barrier effects from underwater noise.
- Increased collision risk with vessels.
- Disturbance at seal haul-out sites.
- Disturbance of foraging seals at sea.
- Changes to water quality.
- Changes to prey availability.

The Applicant concluded [APP-059] that the Project alone or in-combination would not result in an AEoI of The Wash and North Norfolk Coast SAC on the basis of:

- At SEP the onset of PTS arising from construction pile-driving noise is predicted to arise over an area of 0.84km^2 and impact an estimated 0.23 individuals. At DEP the onset of PTS is predicted to arise over an area of 1.44km^2 and impact an estimated 0.11 individuals. The area of within which the onset of PTS is predicted to occur increases to 33km2 should simultaneous pile-driving occur between SEP and DEP and impact 6.2 individuals at SEP and DEP.
- At SEP disturbance arising from construction pile-driving noise, based on TTS, is predicted to arise over an area of 140km^2 and impact an estimated 38.4 individuals. At DEP disturbance is predicted to arise over an area of 220km^2 and impact 17.6 individuals. The area of within which disturbance is predicted to occur increases to 520km^2 should simultaneous pile-driving occur between SEP and DEP and impact 98.3 individuals at SEP and DEP.
- The effective implementation of the MMMP for piling would reduce the risk of PTS and TTS for harbour seal during piling at SEP and DEP.
- Noise arising from other construction activities, including vessels, is lower than that produced from pile-driving and will be both localised and temporary. Therefore, there would be no significant disturbance of harbour seal.
- Barrier effects have the potential to prevent movement of harbour seal between feeding and/or breeding areas, or potentially increasing swimming distances if harbour seal avoid the site and go around it. Disturbance and any barrier effects during pile-driving would be temporary and for a relatively short duration, i.e. during active piling.
- There will be an increase in vessel traffic within and on transit to the offshore sites during all phases of the Project. Vessel movements, where possible, will be incorporated into recognised vessel routes and hence to areas where marine mammals are accustomed to vessels, in order to reduce any increased collision risk. All vessel movements will be kept to the minimum number that is required to reduce any potential collision risk. Additionally, vessel operators will use good practice to reduce any risk of collisions with marine mammals.
- Potential disturbance to seals at haul out sites will not occur at the SEP and DEP Project locations. The Blakeney Point harbour seal haul-out site is located closest to SEP and DEP, 12km from the nearest Project boundary (including export cable corridors and landfall locations). Given the distances between SEP and DEP and the nearest known harbour seal haul-out sites; there is very little potential for any direct disturbance as a result of Project related activities. Also, given that the construction port will be at Great

Yarmouth, vessels transiting to SEP and DEP would not pass within the vicinity of the Blakeney Point haul-out site. Vessel movements to and from any port will be incorporated within existing vessel routes, which would be considerably further from either the Wash or Blakeney Point harbour seal haul-out sites than the 600m, that is the distance at which harbour seal will react to vessel presence.

- Foraging harbour seals have the potential to be disturbed due to underwater noise generating activities, and due to the increased presence of vessels at SEP and DEP. If all harbour seal disturbed by construction pile-driving cease foraging within that area of impact, then a total of 98 harbour seal could potentially be disturbed from foraging during simultaneous piling at SEP and DEP; this effect could occur for up to 33 days. For other activities which have the potential to take place over a longer time frame, of up to four years, less than one harbour seal could be restricted from foraging throughout the entire construction period. harbour seal that are disturbed would not be restricted from foraging, as individuals would be able to forage in other areas, as they are generalist feeders. Any potential changes to water quality during construction of SEP and DEP would be negligible.
- Harbour seal feed on a variety of prey species and are considered to be opportunistic feeders, feeding on a wide range of prey species and have relatively large foraging ranges. The potential impacts of physical disturbance, temporary habitat loss, increased SSC, re-mobilisation of contaminated sediment on changes in prey availability are localised and short in duration. Noise arising from construction pile-driving is highly unlikely to cause significant changes to prey over the entire area impacted. It is more likely that effects would be restricted to an area around the working sites, and the potential areas for habitat loss. Mitigation to reduce the potential impacts of underwater noise for marine mammals would also reduce the potential impacts on prey species.

These conclusions were supported by project mitigation measures detailed in Table 8-11 and 8-12 of the RIAA [REP-059] which included the following embedded mitigation:

- Soft-start and ramp-up (part of MMMP) for Piling Activities)
- Best practice to reduce vessel collision risk
- Best practice to reduce risk of pollution event.

And the production of the following plans:

- MMMP for pile-driving activities;
- MMMP Protocol for UXO clearance activities;
- Southern North Sea SAC SIP.

4.2.4.1 The Wash and North Norfolk Coast SAC – Alone and in-combination effects

During the Examination, queries were raised by NE and the MMO regarding the baseline and reference population, assessment methodology and pathways of effects to this SAC and its harbour seal qualifying feature. These were noted in the RIES [PD-020].

NE stated that that the context for the assessment of the harbour seal feature of the Wash and North Norfolk Coast SAC differs from assessments undertaken for other marine mammal features because this designated feature has an overall unfavourable conservation status [RR-063].

NE [REP6-029] recognised that the population modelling of harbour seal, at both the Management Unit level and SAC level, from both project alone and cumulative effects, shows effectively no difference in the size of the unimpacted population mean and the impacted population mean [REP3-115]. Therefore, the results from the modelling indicated that impacts arising from the Project will not cause any additional decline to the harbour seal populations.

NE confirmed it was satisfied that the Applicant's population modelling is sufficient for it to agree with the Applicant's conclusion of no AEoI to the harbour seal qualifying feature of The Wash and North Norfolk Coast SAC from the project and in-combination [REP8-104].

The joint position statement and the final SoCG between the Applicant and NE records agreement of no AEoI from the Project alone or in-combination for this SAC and its qualifying feature [REP8-042].

Considering the information provided to inform an assessment of AEoI to the harbour seal qualifying feature of the Wash and North Norfolk SAC, the ExA concurred with the Applicant's conclusion of no AEoI either alone or in-combination with plans or projects [ER 26.7.62].

The Secretary of States conclusions are presented in Table 3.

4.2.5 Berwickshire and North Northumberland Coast SAC

The Berwickshire and North Northumberland Coast SAC is approximately 284km from DEP, 291km from SEP and 311km from the export cable corridors, at the closest point. Therefore, there is no potential for direct overlap with the Berwickshire and North Northumberland Coast SAC.

The site is designated for a range of Annex I habitats and grey seal.

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 LSE on the grey seal feature from:

- Underwater noise (including piling, other construction activities, vessels, operational turbines, Operation and maintenance activities and decommissioning activities).
- Barrier effects from underwater noise.
- Increased collision risk with vessels.
- Disturbance at seal haul-out sites.
- Disturbance of foraging seals at sea.
- Changes to water quality.
- Changes to prey availability.

The Berwickshire and North Northumberland Coast SAC was screened out of the LSE by the Applicant on the basis of the distance between the potential impact range of the proposed project and the extent of any impact on individuals from this site are negligible and would result in no potential for LSE [APP-059, APP-062]

NE noted that since the completion of the Applicant's screening, further information had been published that has reported that the maximum foraging range of grey seals is 448km and thus the Berwickshire and North Northumberland SAC is now considered to be within the foraging

range and therefore an LSE could not be screened out. Consequently the Berwickshire and North Northumberland Coast SAC was considered further [PD-020].

NE did however consider that although there is connectivity between the Project and the SAC, the level of connectivity is likely considerably lower than that for the nearer Humber Estuary SAC. Consequently, NE considered that the outcome for the Humber Estuary SAC represents that most precautionary assessment for grey seal sites, and any potential impact to the Berwickshire and North Northumberland SAC would be lower [RR-063].

NE [REP7-111] stated that it considered there would be no AEoI to the grey seal qualifying feature of Berwickshire and North Northumberland SAC.

Considering the information provided to inform an assessment of AEoI to the grey seal qualifying feature of the North Northumberland Coast SAC, the ExA concurred with the Applicant's conclusion of no AEoI either alone or in-combination with plans or projects [ER 26.7.50].

The Secretary of States conclusions are presented in Table 3.

4.3 Onshore Ecology

The Applicant considered three onshore protected sites for AEoI: the River Wensum SAC, the North Norfolk Coast SPA and Ramsar.

4.3.1 River Wensum SAC

The River Wensum SAC covers approximately 382ha and includes the river and certain adjacent floodplain habitats. The export cable crosses the river and direct and indirect impacts arising from geology / contamination and groundwater / hydrology effects during the construction phase of the Project could arise [APP-059].

The qualifying features of the River Wensum SAC are:

- Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation.
- White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes*.
- Desmoulin's whorl snail *Vertigo moulinsiana*.
- Brook lamprey *Lampetra planeri*; and
- Bullhead *Cottus gobio*.

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 RIAA [APP-059 Section 6] assessed the LSE pathways on the Watercourses of plain to montane levels with *R. fluitantis* and Desmoulin's whorl snail qualifying features of this SAC. As noted in the RIES [PD-020], the Applicant provided an assessment of AEoI for the white-clawed crayfish, brook lamprey and bullhead qualifying features of this SAC [REP2-050]. This was in response to concerns raised by NE [RR-063] regarding potential bentonite breakout during drilling activities and in respect of the following potential effect pathways:

- indirect effects on the white-clawed crayfish, brook lamprey and bullhead qualifying features within the SAC boundary arising from geology/ contamination and groundwater /hydrology effects during the construction phase; and
- indirect effects on the white-clawed crayfish, brook lamprey and bullhead qualifying features present within ex-situ habitats /functionally linked land of the SAC arising from geology/ contamination and groundwater/ hydrology effects during the construction phase.

The updated assessment is also summarised in the HRA Integrity Matrices [REP4-011]. The assessment concluded that, taking account of the mitigation measures secured in the updated Outline Ecological Management Plan (OEMP) [REP8-025] and the updated Outline Code of Construction Practice (CoCP) [REP8-023], there would no AEoI to this SAC and its qualifying features. In respect of bentonite, the Applicant proposes to develop a Bentonite Breakout Plan to be included in the final CoCP, which is secured by Requirement 19 of the DCO [REP8-005] and must accord with the Outline CoCP.

NE's position is that until an outline bentonite mitigation plan is agreed, it is unable to conclude with certainty that the likelihood of AEoI to the white-clawed crayfish, brook lamprey and bullhead features of the River Wensum SAC can be avoided [REP8-106, Appendix I5]. However, once the mitigation measures are agreed, it is likely that NE would also agree that the risk of AEoI to the River Wensum SAC will be significantly reduced. This position is also noted in NE's final SoCG (onshore) with the Applicant [REP8-031]. With regard to other potential effects on qualifying features NE has confirmed that there would be no AEoI [REP7-066].

The Applicant [REP7-062] in response to the RIES, confirmed that the Outline CoCP [REP8-023, Section 7.1.4] includes the mitigation measures set out in its Onshore RIAA Technical Note [REP2-050] in relation to sediment management, pollution prevention and bentonite breakout. It also includes a commitment to report all bentonite breakouts within designated sites to NE within 24 hours. Regarding the ExA's query [PD-022] of a possible requirement in the DCO to secure mitigation that removes the risk of AEoI, the Applicant [REP8-052] stated that it did not consider such a requirement to be necessary, stating that risk of bentonite breakout is not unique to the Project and the Applicant is proposing to control the risk in an industry standard manner and in accordance with other DCOs and other consenting regimes. The Applicant considers that mitigation measures are already sufficiently secured that remove any risk of AEoI to the white-clawed crayfish, brook lamprey and bullhead qualifying features of the River Wensum SAC, as secured through the CoCP. The Applicant listed examples of the approaches to this impact pathway in other DCO applications.

The ExA [ER 26.5.11 et seq.] found that the ability to conclude firmly on whether an AEoI could be ruled out was frustrated by the Applicant not providing the necessary plans and documents requested by NE. The ExA is not content that effective conclusions on whether an AEoI could be ruled out or not are proposed by the Applicant to be deferred to a post-consent stage. Nonetheless, the ExA accepts that, in particular to the mitigation identified for the River Wensum SAC, the mitigation measures are not unique to the Project or anything unusual for the industry. This gives some reassurance that potential mitigation could be adopted to reduce the risk of an AEoI.

The ExA agrees with NE that the risks need to be understood, considered appropriately and mitigated sufficiently before any development takes place. The submission of the relevant mitigation documents in advance of commencement would allow this to happen and ensure

proper measures are taken. Therefore, the ExA recommends that an AEoI could be ruled out for all onshore features relation to the SAC.

The Secretary of States conclusions are presented in Table 3.

4.4 Offshore and intertidal ornithology

Section 9 of the RIAA [APP-059] comprises the Applicant's assessment of AEoI of protected sites designated for offshore ornithology qualifying features. The assessment is also summarised in the HRA Screening and Integrity Matrices [REP4-009 and REP4-011]. During the Examination, additional assessments were provided and updated regularly [REP1-057, REP2-036, REP5-043, REP7-051] and a final updated version was submitted before the close of the Examination [REP8-038].

LSE pathways to offshore and intertidal ornithological qualifying features of protected sites from the Project alone and in-combination impacts were assessed for the following sites:

- Protected sites in England:
  - Alde-Ore Estuary SPA and Ramsar;
  - Breydon Water SPA and Ramsar,
  - Broadland SPA and Ramsar,
  - Coquet Island SPA,
  - Farne Islands SPA,
  - Flamborough and Filey Coast SPA,
  - Gibraltar Point SPA and Ramsar,
  - Greater Wash SPA,
  - Humber Estuary SPA and Ramsar,
  - Minsmere-Walberswick SPA and Ramsar,
  - Nene Washes SPA and Ramsar,
  - North Norfolk Coast SPA and Ramsar,
  - Ouse Washes SPA and Ramsar,
  - Outer Thames Estuary SPA,
  - The Wash SPA and Ramsar,
- Protected sites in Scotland:
  - Auskerry SPA,
  - East Caithness Cliffs SPA,
  - East Mainland Coast, Shetland SPA,
  - Fair Isle SPA,
  - Forth Islands SPA,
  - Foula SPA,
  - Fowlsheugh SPA,
  - Hermaness, Saxa Vord and Valla Field SPA,
  - Hoy SPA,
  - Imperial Dock Lock, Leith SPA,
  - Marwick Head SPA,
  - North Caithness Cliffs SPA,
  - Noss SPA,
  - Papa Stour SPA,
  - Ronas Hill – North Roe and Tingon SPA,
  - St Abbs Head to Fast Castle SPA,
  - Troup, Pennan and Lion's Heads SPA,
  - West Westray SPA,
  - Ythan Estuary, Sands of Forvie and Meikle Loch SPA (and SPA extension) and Ramsar

The Applicant's assessment relied on embedded mitigation relevant to the offshore ornithology assessment that had been incorporated into the Project's design [APP-059 and REP8-021]. These included:

- excluding the shallower area to the northwest of the existing Dudgeon OWF from the DEP North array area boundary, in-part based on advice from NE that the shallower area this shallow area was believed to be important for feeding birds and that it would therefore be of benefit to exclude the area from development.
- Increasing the air gap to 30m above HAT in response to consultation feedback, providing further reduction of potential collision risk for offshore ornithology receptors.
- Mitigating potential impacts on red-throated diver during construction, operation and maintenance works by the implementation of best practice protocol for minimising disturbance to red-throated diver. This includes where possible to avoid works during the over winter period 1st November to 31st March (inclusive); selecting routes that avoid known aggregations of birds and restricting vessel movements to existing navigation routes (where the densities of red- throated divers are typically relatively low).

The Applicant's Schedule of Mitigation and Mitigation Routemap [REP8-021] also identified how and where such mitigation measures are secured within the DCO.

During Examination the following offshore ornithology NSN sites and qualifying features were the subject of concerns raised by NE and other IPs.

North Norfolk Coast SPA and Ramsar:

- Sandwich tern; and
- Pink-footed goose.

Greater Wash SPA:

- Sandwich tern; and
- Red-throated diver.

Outer Thames Estuary SPA:

- Red-throated diver.

Alde-Ore Estuary SPA and Ramsar:

- Lesser black-backed gull.

Flamborough and Filey Coast SPA:

- Kittiwake;
- Gannet;
- Guillemot;
- Razorbill; and
- Seabird assemblage (includes puffin).

The RIES [PD-020, Paragraphs 3.3.19 to 3.3.42 and Table 3-4] summarised the concerns raised during the Examination. This included matters raised by NE [RR-063, REP3-103, REP3-143, REP3-147, REP4-049, REP5-091, REP5-094] and the RSPB [RR-083, REP1-161, REP3-162].

For all other sites except those listed above there were no significant concerns raised by NE or the ExA during Examination. The Secretary of State has considered the potential for the Project to constitute an AEoI for each feature for which a significant effect is likely and the Secretary of State's conclusions on these sites are summarised in Table 3, with no additional comment.

The Secretary of State has given further consideration, which is summarised below, to the qualifying features and sites that were the subject of concerns raised by NE, the ExA and other IPs, namely:

- North Norfolk Coast SPA and Ramsar;
- Greater Wash SPA;
- Outer Thames estuary SPA;
- Alde-Ore Estuary SPA and Ramsar; and
- Flamborough and Filey Coast SPA.

4.4.1 North Norfolk Coast SPA and Ramsar

The North Norfolk Coast SPA is a coastal site covering an area of approximately 78.87km^2. 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 40km from the site at its nearest point [APP-059].

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

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

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

Qualifying features for which LSE could not be ruled out are:

- Pink-footed goose;
- Dark-bellied Brent goose;
- Knot;
- Pintail;
- Wigeon;
- Sandwich tern; and
- Common tern.

Potential impacts to all qualifying features for which an LSE cannot be ruled out arise from collisions and, for Sandwich tern, displacement/barrier effects.

The assessment undertaken by the Applicant concluded no AEoI subject to adherence to mitigation measures presented in the OEMP [REP8-025] and the Outline CoCP [REP8-023], as secured by the DCO.

4.4.1.1 Dark-bellied brent goose, Knot, Pintail, Wigeon, Common tern

Potential impact on dark-bellied brent goose, knot, wigeon and common tern for which an LSE cannot be ruled out arise from collision impacts.

During Examination there were no issues raised by NE with regards to the Applicant's conclusion of no AEoI for the qualifying species: and this was agreed with the Applicant in the SoCG [REP3-103].

The ExA agrees with the conclusions made by the Applicant and NE and that an AEoI can be ruled out from the Project alone and in-combination [ER 26.8.124 and ER 26.8.126]

The Secretary of States conclusions are presented in Table 3.

4.4.1.2 Pink-footed goose

Potential impacts on pink-footed goose are collision impacts and direct effects on wintering birds present in ex-situ habitats/ functionally linked land of the SPA and Ramsar.

During Examination there were no issues raised by NE with regards to the Applicant's conclusion of no AEoI on pink-footed geese with regards to collision impacts and this was agreed with the Applicant in the SoCG [REP3-103].

With regards to potential direct effects on habitat, NE raised concerns with the Applicant's assessment of pink-footed geese of the SPA and Ramsar, which related to the proposed mitigation measures [RR-063]. Broadland District Council (BDC) and South Norfolk Council (SNC) also noted the potential for an impact on pink-footed geese resulting from the Applicant's proposed cable routes, and advised that a Pink-footed Goose Management Plan should be a requirement of any consent [REP1-066, REP1-090].

During two pre-application winter surveys spanning between 2019 and 2021 no pink-footed geese were recorded within the Order Limits, with the nearest flock of 3,500 birds recorded over 800m from the area of proposed works [APP-059].

The Applicant's commitment to providing a mitigation plan is within the OEMP [REP8-025] and is secured by Requirement 13 of the DCO. This requires an EMP to be submitted to the Local Authorities, in consultation with NE and other bodies, prior to the commencement of any phase of the onshore works. Following a request from ExA the Applicant provided without prejudice wording to be included in the DCO, although nothing that the Applicant considered this unnecessary [REP8-052]:

a) *No phase of the ~~of the~~ onshore works within 10.4km of the North Norfolk Coast Special Protection Area may commence until a scheme for protection and mitigation measures for pink footed geese has been submitted ~~to and approved~~ <u>for approval at least four months prior to any works commencing and been approved</u> by the relevant planning authority in consultation with ~~NE~~ <u>Natural England</u>.*

b) *The scheme of protection and mitigation measures submitted for approval under sub-paragraph (1) must include-*

(a) details of pre-construction surveys to be undertaken to establish whether any pink footed geese are present on any of the land affected, or likely to be affected, by that phase of the onshore work;

(b) details of ongoing monitoring to be undertaken during the phase of the onshore work; and

(c) details of the mitigation measures to be undertaken if the pre-construction or ongoing monitoring identifies the presence of pink footed geese in any of the land affected, or likely to be affected, by that phase of the onshore work.

c) *The relevant phase of the onshore works must be carried out in accordance with any scheme approved under sub-paragraph [a]. Sub-paragraph [a] does not apply if the relevant planning authority confirms, after consultation with Natural England, that no scheme of protection and mitigation measures for pink footed geese is required for the relevant phase of the of the onshore works.*

NE [REP8-106], in summary of its position, requested that the DCO include a generic condition securing that a standalone Pink-footed Goose management plan will be submitted to the Local Authorities for agreement with the relevant SNCBs at least four months prior to any works commencing to ensure that appropriate mitigation measures will be agreed prior to any onshore works commencing. In principle, the Applicant did not agree that this was necessary [REP8-062].

The ExA [ER 26.5.23 et seq.] notes that BDC and SNC requested that a Pink-footed Goose management plan be secured by a requirement in the DCO. In addition, NE required best practice measures to be taken. The Applicant has declined this proposal and sought its own approach to mitigation that does not fully address NE's concerns for Pink-footed Goose. The ExA agree with NE that the risks need to be understood, considered appropriately and mitigated sufficiently before any development takes place. The submission of the relevant mitigation documents in advance of commencement would allow this to happen and ensure proper measures are taken. Post consent, if the mitigation for Pink-footed Goose is considered not to reduce the risk of an AEoI, the Applicant would retain the option of a submitting mitigation based upon best practice, thus resolving NE's concerns. The ExA have therefore proposed a new Requirement 34 to require delivery and approval of these plans prior to the commencement of the development. The ExA adopted the without prejudice wording provided by the Applicant, with amendments to sub-paragraph (1) securing provisions relating to the geographical definition of the mitigation scheme and adding a timeframe for the approval process (see underlined amendments above). The ExA advises that, subject to these amendments to the DCO, it can be concluded that an AEoI could be ruled out for all onshore HRA concerns. The Secretary of State agrees with the ExA regarding the premise for such a condition.

As NE had not had the opportunity to comment on the Applicant's proposed DCO requirement, in the first consultation letter the Secretary of State invited NE to comment on the without-prejudice draft DCO Requirement provided by the Applicant [REP8-052, ID 5, page 163]. NE

confirmed[21] that it welcomes the Applicant's proposed condition, but that some amendments were required to make it acceptable. NE advised that suitable timelines are included within this paragraph of the condition in order to ensure the Pink-footed Goose Mitigation Plan can be agreed in a timely manner prior to the onset of the construction phase. The Secretary of State agrees and accepts the ExA's recommendation of four months. NE did not raise concern regarding the proposed 10.4km buffer distance.

NE advise that [b] 'Scheme of protection and mitigation measures', is instead worded in accordance with its latest Pink-footed Goose Guidance, updated in line with recent advice to other projects, as follows:

a) In advance of works and to an agreed timescale, map all fields within the cable corridor DCO order limits (red line boundary) to the agreed extent of the species' foraging range and a suitable buffer either side of the order limits.

b) Delay works near potential goose foraging locations by implementing the following conditions:

- Between 1st November and 31st January inclusive, works must avoid all areas that have been planted with sugar beet until 14 days after they have been harvested, or such a time after harvesting where the beet has been drilled in.
- If the proposed works are outwith a beet field/ 250m away from foraging birds in a neighbouring beet field/the works are in the field next door but with one hedge in between, then works can proceed.

The Secretary of State does not consider that it is necessary to secure such details within the DCO as proposed by NE. She is content that, should the relevant planning authority deem it appropriate, having consulted NE, it would require the scheme of protection and mitigation measures to include the commitments and measures as suggested by NE. NE must be consulted by the relevant planning authority, and the Secretary of State is satisfied that the Requirement as drafted allows for the detail of the mitigation scheme, for example appropriate seasonal restrictions to works, to be agreed post-consent by the relevant planning authority in consultation with NE as the SNCB. The Secretary of State agrees with the Applicant that a 10.4km buffer distance is appropriate. Therefore, the Secretary of State agrees with the Applicants without-prejudice wording of Requirement 34 and the ExA's recommendation of a four-month approval timeframe.

The Secretary of State therefore agrees with the ExA and is satisfied that an AEoI of the North Norfolk Coast SPA and Ramsar due to impacts on pink-footed goose can be excluded. On this basis, the Secretary of State agrees to the Applicants request[22] to remove reference to measures

[21] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010109/EN010109-002267-EN010109%20-%20Sheringham%20Shoal%20and%20Dudgeon%20Offshore%20Wind%20Farm%20Extension%20Project,%20Request%20for%20Information%20-%20Appendix%203%20PFG%20Mitigation%20Strategy%20-%20461164%20-%2020.12.2023.pdf

[22] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010109/EN010109-002274-23.2%20The%20Applicant's%20Response%20to%20the%20Secretary%20of%20State's%20Request%20for%20Information%20dated%2022%20November%202023.pdf

for the protection of pink-footed goose within the OEMP, as to do so would duplicate controls, potentially causing uncertainty as to the discharge of those requirements and subsequent implementation. The Secretary of State has therefore amended Schedule 18 of the DCO to ensure that the updated OEMP (Revision F)[23], as provided by the Applicant, is the correctly referenced certified version.

4.4.1.3 Sandwich tern

Potential impact on Sandwich tern for which an LSE cannot be ruled out are collision impacts during breeding seasons. This follows agreement with NE that a displacement assessment for Sandwich tern is not required [REP2-045] and the subsequently updated HRA screening matrices that screened out displacement effects for Sandwich tern [REP4-009].

The Applicant concluded that there would not be an AEoI arising from the Project alone but an AEoI could not be ruled out in-combination with other plans or projects [REP4-011].

Following revisions made to the collision risk modelling[24] the estimated annual mortality from SEP alone is estimated to be 1.11 (95% CI 0.06 – 3.65) birds per year. This equates to 0.12% (95% CI 0.01 – 0.38) of the baseline mortality for the North Norfolk Coast SPA Sandwich tern breeding population. Similarly, the estimated mortality arising from DEP alone is 4.43 (95% CI 0.54 – 13.01) birds per year; 0.46 (95% CI 0.06-1.35)% of the baseline mortality. Combined SEP and DEP are estimated to impact on 5.54 (95% CI 0.60 – 16.66) Sandwich terns per year; 0.57% (95% CI 0.06 – 1.73) of the baseline mortality [REP7-51, REP8-038].

NE agree with the Applicant that there would not be an AEoI of sandwich tern from the Project alone. NE also agreed with the Applicant that AEoI in-combination with other offshore wind farms cannot be ruled out [REP5-091, REP8-102].

In respect of in-combination effects, the predicted level of in-combination mortality arising from collision is estimated to be between 48.6-87.8 birds, resulting in an increase to baseline mortality of 5.0% - 9.1% [REP8-038]. NE refer to in-combination impacts from only between 84.6 and 87.8 collisions per annum, increasing baseline mortality from between 8.8% and 9.1 % [REP8-102]. NE also notes that this may be an underestimate due to the less precautionary flight speed used, the in-combination impacts being restricted to projects within the breeding season foraging range and uncertainties over the impacts HPAI may have had on the breeding Sandwich tern population. However, NE agree with the Applicant that an AEoI cannot be excluded for collision impacts in-combination with other plans and projects [REP8-102].

The ExA agrees that an AEoI of Sandwich tern of the North Norfolk Coast SPA cannot be ruled out in-combination with other plans or projects [ER 26.8.122]

The Secretary of States conclusions are presented in Table 3.

[23] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010109/EN010109-002270-9.19%20Outline%20Ecological%20Management%20Plan%20Revision%20F%20Clean.pdf

[24] Note these figures are based on CRM using the largest population size, design-based density estimates and the flight speed of Fijn and Gyimesi (2018) as a model input (REP7-091 Table 14-4). This provides the largest estimated annual number of collisions, which have then been taken forward in considering the scale of compensation that could be required.

4.4.2 The Greater Wash SPA

The Greater Wash SPA covers 353,578ha and is located between Bridlington Bay, East Yorkshire and the area just north of Great Yarmouth on the Norfolk coast. The SPA has a landward boundary at Mean High Water and an offshore extent of around 30 km. The seaward boundary of the Greater Wash SPA is located approximately 7km from SEP at its nearest point, and 16km from DEP.

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

Qualifying features for which LSE could not be ruled out are:

- Little gull,
- Common tern,
- Sandwich tern,
- Red-throated diver.

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

Potential impacts to little gull, common tern and Sandwich for which an LSE cannot be ruled out arise from collisions [REP4-011].

Potential impacts to red-throated diver for which an LSE cannot be ruled out arise from displacement/barrier effects [REP4-011].

4.4.2.1 Little gull

Collision risk modelling estimated mean annual mortality from SEP alone to be 0.53 (95% CI 0.00 – 1.80) birds per year which increases baseline mortality of the Greater Wash SPA to between an estimated 0.01 to 0.03%

Similarly, an estimated mean mortality of 2.36 (95% CI 0.00 – 8.08) collisions per year for DEP equates to an increase in mortality of Greater Wash SPA population of between 0.06 to 0.12%. The combined Project mortality of 2.89 (95% CI. 0.00 – 9.88) little gulls equates to an increase in existing mortality of 0.07% and 0.14% [REP8-038].

The total predicted annual in-combination collision mortality for little gull from the Greater Wash SPA is 70.2 individuals. Between them, SEP and DEP contribute 2.9 birds to this total, or 4.1%. The predicted in-combination mortality would increase the baseline adult mortality rate of the Greater Wash area of search population of little gull by 1.8% to 3.5% [REP8-038].

The Applicant concluded that there would not be an AEoI to the little gull feature alone or in-combination with other plans or projects [APP-059]

NE agreed that there would be no AEoI on little gull from the Project alone and in-combination with other plans and projects [REP8-102].

The ExA concludes in regards to impacts on little gull at the Greater Wash SPA that an AEoI can be ruled out [ER 26.8.110].

The Secretary of States conclusions are presented in Table 3.

4.4.2.2 Common tern

The Applicant concluded that there would not be an AEoI to the common tern feature alone or in-combination with other plans or projects [APP-059, REP8-038]

The estimated Project mortality of 0.73 (95% CI. 0.00 – 3.25) common tern per year equates to an increase in existing mortality of 0.98 (95% CI 0.00 – 4.39)% [REP8-038].

The total predicted annual in-combination collision mortality for common tern from the Greater Wash SPA is less certain with an estimated addition three collisions per year reported by other offshore wind farm projects [REP8-038].

NE agreed that there would be no AEoI on common tern from the Project alone and in-combination with other plans and projects [REP3-103, REP5-091].

The ExA concludes in regards to impacts on common tern at the Greater Wash SPA that an AEoI can be ruled out [ER 26.8.107].

The Secretary of States conclusions are presented in Table 3.

4.4.2.3 Sandwich tern

As with the estimated impacts on Sandwich tern qualifying feature for North Norfolk Coast SPA (See Section 4.4.1.3), the Applicant concluded that there would not be an AEoI arising from the Project alone but an AEoI could not be ruled out in-combination with other plans or projects [REP4-011].

Following revisions made to the collision risk modelling[25] the estimated annual mortality from SEP alone is estimated to be 1.11 (0.06 – 3.62) birds per year. This equates to 0.11% (95% CI 0.01 – 0.38) of the baseline mortality for the Greater Wash SPA Sandwich tern breeding population. Similarly, the estimated mortality arising from DEP alone is 4.39 (95% CI 0.54 – 12.84) birds per year; 0.46 (95% CI 0.06-1.33)% of the baseline mortality. Combined SEP and DEP are estimated to impact on 5.5 (95% CI 0.60 – 16.47) Sandwich terns per year; 0.57% (95% CI 0.06 – 1.71) of the baseline mortality [REP7-51, REP8-038].

NE agree with the Applicant that there would not be an AEoI of Sandwich tern from the Project alone. NE also agreed with the Applicant that AEoI in-combination with other offshore wind farms cannot be ruled out [REP5-091, REP8-102].

In respect of in-combination effects, the predicted level of in-combination mortality arising from collision is estimated to be 87.4 birds, resulting in an increase to baseline mortality of 9.1%

[25] Note these figures are based on CRM using the largest population size, design-based density estimates and the flight speed of Fijn and Gyimesi (2018) as a model input (REP7-091 Table 14-4). This provides the largest estimated annual number of collisions, which have then been taken forward in considering the scale of compensation that could be required.

[REP8-038]. NE refer to in-combination impacts from only between 85.0 and 87.8 collisions per annum, increasing baseline mortality from between 8.8% and 9.1 % [REP8-102].

Recognising the concerns raised by NE regarding the potential underestimate of collision numbers as raised for the North Norfolk Coast SPA, NE agree that an AEoI cannot be excluded for collision impacts in-combination with other plans and projects [REP8-102].

The ExA agrees that an AEoI of Sandwich tern of the Greater Wash SPA cannot be ruled out in-combination with other plans or projects [ER 26.8.105 and ER 28.8.122].

The Secretary of States conclusions are presented in Table 3.

4.4.2.4 Red-throated diver

The Applicant concluded no AEoI alone or in-combination to red-throated diver from displacement effects at Greater Wash SPA [APP-059]

Both NE and the RSPB raised concerns with regards to the assessment of displacement on red-throated divers. In particular the rates of displacement of red-throated diver caused by construction vessels. In terms of displacement rates, NE put forward its own preferred rates [RR-063, Appendix B Table 3] and considered that the displacement impact should principally be considered in terms of the area over which some level of displacement may occur, both in terms of km^2 and % of the Greater Wash SPA [REP3-143, Paragraph 2].

The Applicant has provided assessment updates including the application of the recommended displacement gradient [REP5-043]. The total affected area of the Greater Wash SPA at any one point in time (assuming one cable-laying vessel would be active at any one time, and that displacement effects would occur up to 2km from the vessel) would be 12.57km^2, representing around 0.36% of the total Greater Wash SPA (3,535.78km^2).

The sequential construction scenario for the Project would, at worst, result in approximately 25 days of cable-laying within proximity to the Greater Wash SPA [REP4-031]. In any event, the Applicant anticipated birds would return to the affected area within a few hours after vessel departure.

During the operational phase impacts from displacement/barrier effects are predicted to increase the rate of mortality by between 0.01% and 0.07% from the project-alone and 0.87% and 8.73% from in-combination impacts [APP-059, REP8-038].

The area of the Greater Wash SPA over which displacement could occur, in-combination with other plans and projects increased from 20.48% (without the Project) to 20.63% [REP8-038].

The Applicant has proposed a number of measures aimed to mitigate the potential impacts arising from displacement and disturbance caused by vessels throughout the lifetime of the Project [REP8-038]. These include:

- Reducing the developable area of SEP through exclusion areas in the south-east and south-west corners of the SEP array area encompassing an area of approximately 7.56 km2 [REP8-004]. This would reduce the physical presence of the Project on outer edges of the Greater wash SPA.
- Seasonal restrictions on export cable laying activity within the SPA that minimise disturbance during period 1 November and 31 March (inclusive) [REP8-038]

- Adopting a best practice protocol as presented in the Outline Project Environmental Management Plan Revision D [REP7-035], that minimises disturbance to red-throated diver by:
    - Where possible avoiding works during the over winter period 1st November to 31st March (inclusive);
    - Selecting routes that avoid known aggregations of birds;
    - Restricting (to the extent possible) vessel movements to existing navigation routes (where the densities of red-throated divers are typically relatively low);
    - Maintaining direct transit routes (to minimise transit distances through areas used by red-throated diver);
    - Considering the potential for crew transfer vessels to travel in convoy en route to the wind farm sites and seeking to do so where it is considered practicable;
    - Avoidance of over-revving of engines (to minimise noise disturbance); and
    - Briefing of vessel crew on the purpose and implications of these vessel management practices (through, for example, tool-box talks).

These mitigation measures can be secured in the OPEMP [REP7-035] and the Work Plans [REP8-004] and through Conditions made within the DML.

With the mitigation measures presented above secured through the DML, NE is satisfied that there would be no AEoI in respect of the red-throated diver feature of the Greater Wash SPA [REP8-102].

The ExA recognised that the mitigation measures identified may impact upon the developable area of the SEP array, but considered the measures to be wholly necessary in this instance and were unlikely to affect the viability of the Project. Subject to these mitigation measures being secured the ExA concluded that an AEoI for both Greater Wash SPA could be ruled out [ER 26.8.104].

The Secretary of States conclusions are presented in Table 3.

4.4.3 Outer Thames Estuary SPA

The Outer Thames Estuary SPA covers an area of 3,924km2 located on the east coast of England between the counties of Norfolk (on the north side) and Kent (on the south side). The site comprises areas of mobile mud, sand, silt and gravely sediment, incorporating areas of sandbanks. The site lies at its closest point 75km from the SEP and DEP array areas.

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. It also protects foraging areas for common tern and little tern during the breeding season.

Qualifying features for which LSE could not be ruled out are:

- Red-throated diver.

Potential impacts to red-throated diver for which an LSE cannot be ruled out arise from displacement/barrier effects [REP4-009 and REP4-011].

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

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

Furthermore, the SACOs for the Outer Thames Estuary SPA[26] note a range of attributes which are considered to describe the site's ecological integrity. One of the attributes for the red-throated diver feature is "Disturbance caused by human activity". The target associated with this attribute is to *Reduce the frequency, duration and/ or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed*.

4.4.3.1 Red-throated diver

The Applicant concluded no AEoI alone or in-combination to red-throated diver from displacement effects at Outer Thames Estuary SPA [APP-059, REP8-038].

Due to the distance the Outer Thames Estuary SPA is from the Project array areas no displacement impacts to red-throated diver from the physical presence of the arrays are predicted.

The proposed operations and maintenance base for SEP and DEP is situated in Great Yarmouth. Vessels transiting to and from SEP and DEP to the base will transit through the Outer Thames Estuary SPA. Consequently, there is the potential for disturbance and displacement of SPA qualifying birds due to these activities [APP-059].

The Applicant estimated that the increase in mortality arising from disturbance caused by Project related vessel activity could increase mortality within the Outer Thames Estuary red-throated diver population by 0.05% [APP-059]. This was based on their being 100% displacement and 1% level of mortality within 2km of the transiting vessel.

Concerns were raised by NE regarding the level of displacement caused by vessels if transiting from the likely favoured port at Great Yarmouth to the Project through the Outer Thames Estuary SPA. Following discussions between the Applicant and NE and the development of revised mitigation measures aimed at reducing impacts from vessels (Section 4.4.2.4) [REP8-038], NE

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

agreed that there would be no AEoI of the red-throated diver from disturbance/ displacement at the Outer Thames Estuary SPA from the Project, either alone or in-combination [REP8-102].

On the basis that the proposed mitigation measures would be secured the ExA agreed that an AEoI from the Project alone or in-combination with other plans and projects could be ruled out [ER 26.8.132].

The Secretary of States conclusions are presented in Table 3.

4.4.4 Alde-Ore Estuary SPA and Ramsar

The Alde-Ore Estuary and Ramsar site covers an estuary complex that supports a variety of habitats for breeding and wintering birds. SEP and DEP are situated approximately 114km and 120km respectively from Havergate Island, the breeding location for lesser black-backed gull within the Alde-Ore Estuary SPA, at the nearest point.

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

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

No works for the Project will take place within the SPA.

Qualifying features for which LSE could not be ruled out are:

- Lesser black-backed gull.

Potential impacts to lesser black-backed gull for which an LSE cannot be ruled out arise from Collision impacts [APP-059, REP4-009].

4.4.4.1 Lesser black-backed gull

The mean maximum foraging range of lesser black-backed gull is 127km (±109km) and the maximum foraging range is 533km (Woodward et al., 2019).

The Applicant [APP-059] concluded no AEoI alone or in-combination to lesser black-backed gull from collision risk. During examination NE raised concerns over the apportioning of the impacts on lesser black-backed gull during the breeding period [RR-063] and these were subsequently updated by the Applicant [REP2-036].

Collision risk modelling estimated mean annual mortality from SEP alone to be 0.07 (95% CI 0.00 – 0.33) birds per year, which increases baseline mortality of the Alde-Ore Estuary SPA and Ramsar to an estimated 0.02%. Similarly, an estimated mean mortality of 0.17 (95% CI 0.00 – 0.85) collisions per year for DEP equates to an increase in the baseline mortality of Alde-Ore Estuary SPA and Ramsar population by 0.04%. The combined Project mortality of 0.24 (95% CI.

0.00 – 1.18) collisions per year equates to an increase in baseline mortality of 0.06% [REP8-038].

Following the updated assessment NE confirmed that there would be no AEoI to the Alde-Ore Estuary SPA from the Project alone or in-combination [REP5-091]. The ExA agreed with the joint conclusions reached that an AEoI could be ruled out for the lesser black-backed gull qualifying feature of the Alde-Ore Estuary SPA, alone or in-combination [ER 26.8.21].

The Secretary of States conclusions are presented in Table 3.

4.4.5 Flamborough and Filey Coast SPA

The Flamborough and Filey Coast SPA covers 8,040 ha of the North Yorkshire coast between Bridlington and Scarborough and includes a 2 km seaward extension. SEP and DEP are 112km and 116km respectively from the Flamborough and Filey Coast SPA boundary at their nearest points.

Flamborough and Filey Coast qualifies as an SPA by supporting over 1% of the biogeographical populations of four regularly occurring migratory species: kittiwake, gannet, guillemot and razorbill. It also qualifies for its breeding seabird assemblage, which is of European importance. The breeding seabird assemblage comprises herring gull, fulmar, shag, cormorant, and puffin, as well as the gannet, kittiwake, guillemot, and razorbill populations.

Qualifying features for which LSE could not be ruled out are:

- Gannet,
- Kittiwake,
- Guillemot,
- Razorbill,
- Seabird assemblage.

In addition to the generic conservation objectives for SPAs presented in Section 1.3, supplementary conservation objectives for the individual qualifying features of the site include:

- restoring the size of the kittiwake breeding population to above 83,700 pairs, whilst avoiding deterioration from the current level indicated by the latest mean peak count or equivalent;
- maintaining the size of the gannet breeding population to above 8,469 pairs, whilst avoiding deterioration from the current level indicated by the latest mean peak count or equivalent;
- maintaining the size of the razorbill breeding population above 10,570 pairs, whilst avoiding deterioration from the current level indicated by the latest mean peak count or equivalent;
- maintaining the size of the guillemot breeding population to above 41,607 pairs whilst, avoiding deterioration from the current level indicated by the latest mean peak count or equivalent;
- maintaining the overall abundance of the seabird assemblage above 216,730 individuals, whilst avoiding deterioration from the current level indicated by the latest mean peak count or equivalent; and
- maintaining the diversity of the seabird assemblage: the total number of species should not be reduced.

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

The Secretary of State has considered the potential for the Project to constitute an AEoI from the Project alone and in combination with other projects for each feature for which a significant effect is likely.

Potential impacts to gannet, kittiwake and seabird assemblage for which an LSE cannot be ruled out have been identified as being from collision impacts [APP-059 and REP4-009].

Potential impacts to gannet, guillemot, razorbill and seabird assemblage for which an LSE cannot be ruled have been identified as being from displacement and barrier effects [APP-059 and REP4-009].

4.4.5.1 Gannet

The Applicant concluded no AEoI alone or in-combination to gannet from collision risk [APP-059, REP8-038]. During examination NE raised concerns over the collision risk modelling and also the inclusion of additional projects within the in-combination impacts. NE specifically advised on the approach to be undertaken when considering the HP4 project [RR-063]. The applicant revised the assessment based on the advice received [REP8-038].

The Applicant calculated the combined estimated annual mortality from SEP and DEP arising from displacement to be 2.6 (95% CI 1.11 – 4.35) birds [REP8-038 Table 8-5]. Based on displacement rates of 70% and 1% mortality. This would represent between 0.10 and 0.14% (95% CI 0.04 – 0.23) increase in the baseline mortality rate.

The Applicant estimated the annual collision related mortality for the Project to be 0.34 (95% CI 0.02-1.17) [REP8-038 Table 8-4] birds per year. This was based on an avoidance rate of 99.2% and a macro avoidance of 70%, as per advice received from NE [RR-063]. This would increase the baseline mortality rate by 0.02% (0.00-0.05%), based on a population of 26,784 individuals and a baseline adult mortality rate of 0.081.

The combined annual mortality arising from both displacement effects and collision impacts is estimated to be 2.94 (95% CI1.13 – 5.53) adult birds. Increasing the baseline mortality by an estimated 0.14% (95% CI 0.05 – 0.25). [REP8-038 Table 8-5, ER Table 5].

The predicted annual in-combination mortality arising from displacement is estimated to be between 55 and 73 adult birds per year based on displacement rates of 60% to 80% and a mortality rate of 1% [REP8-038 Table8-7]. This equates to increasing the adult mortality rate between 2.54% and 3.36%.

The predicted annual in-combination mortality arising from collision impacts is estimated to be 67 individuals, increasing baseline adult mortality rate by 3.1% [REP8-038 Table 8-8].

The combined in-combination impacts arising from both displacement and collision impacts is estimated to be between 122.5 and 140.5 adult gannets per year, depending on the displacement rate used. This includes the impacts estimated to occur from the consented HP4 offshore wind farm and the Rampion 2 offshore wind farm. This increases the adult baseline mortality rate by between 5.6% and 6.5% [REP-038 Table 8-9]. The ExA references a

cumulative mortality of 131.5 adult birds [ER Table 5], which is based on a 70% displacement rate.

The in-combination counterfactual of the population size is calculated as being 0.75 and the counterfactual growth rate is predicted to be no less than 0.993 [REP8-038 Table 8-10].

The RSPB recommended a lower avoidance rate of 98% compared with 98.9% used by the Applicant in their assessment, as recommended by NE. Furthermore the RSPB does not agree with the approach taken by the Applicant in their Population Viability Analysis. The RSPB has advised that an AEoI cannot be ruled out [RR-083].

Based on the updated information provided during Examination and the estimated levels of mortality [REP5-091], NE advised that there is no AEoI of the gannet feature of the Flamborough and Filey Coast SPA for the Project alone and in-combination [REP5-094, REP8-102].

The ExA recognised the concerns raised by the RSPB within the representations but concluded that that an AEoI from the combined collision and displacement impacts on gannet from the Project alone and in-combination with other plans or projects could be excluded [ER 26.8.50].

The Secretary of States conclusions are presented in Table 3.

4.4.5.2 Kittiwake

The Applicant concluded no AEoI for the kittiwake qualifying feature of the Flamborough and Filey Coast SPA from the Project alone. The applicant could not exclude AEoI for the kittiwake feature in-combination with the other plans or projects.

Following advice received from NE, which included revised avoidance rates that reduced the estimated impacts [REP5-091], the Applicant updated the collision risk modelling and estimated that the annual collision related mortality for the Project alone to be 6.36 (0.91-17.01) birds per annum [REP8-038]. This would increase the baseline mortality rate by up to 0.04% (0.01-0.11%), based on a population of 103,070 and a baseline adult mortality rate of 0.146.

The estimated in-combination collision impact is 292.7 adult kittiwakes per year. Increasing adult baseline mortality rate by 1.9%. The median Counterfactual Growth Rate after 35 years would be 0.997 and median Counterfactual Population Size is 0.871 [REP8-038 Table 7-2 and Table 7-3].

The Secretary of State notes the advice provided by NE on the inclusion of potential impacts arising from projects for which compensation has previously been agreed [REP8-102]. By including the estimated collision impacts from these projects (albeit using a lower avoidance rate than used for estimating collision mortality for other projects) the estimated number of collisions per year increases by 101.1 birds, to a total in-combination figure of 394 collisions per year. This increases the baseline mortality to 2.6% and the Counterfactual Growth Rate is reduced to between 0.996 and 0.995 and the Counterfactual Population Size is reduced to between 0.859 and 0.798 [REP8-102 Table 4].

NE has concluded that an AEoI of kittiwake feature of Flamborough and Filey Coast SPA can be excluded from collision mortality arising from the Project alone. NE has advised that because the kittiwake feature has a ‘restore’ conservation objective requiring the population to be returned to previous levels, and the predicted level of mortality would mean the population could decline

from current levels, it could not rule out an AEoI from collision mortality in combination with other plans and projects. This conclusion is irrespective of whether compensated projects are included on the in-combination total, as the level at which predicted impacts result in an AEoI had already been reached [REP8-102].

The ExA is satisfied that an AEoI to the kittiwake qualifying feature of the Flamborough and Filey Coast SPA can be excluded from the Project alone [ER 26.8.33]. The ExA agrees with the Applicant and NE that it is not possible to exclude an AEoI from in-combination kittiwake collision mortality [ER 26.8.34].

The Secretary of States conclusions are presented in Table 3.

4.4.5.3 Guillemot

The Applicant concluded no AEoI alone or in-combination to guillemot from displacement/barrier effects during the breeding and non-breeding season [APP-059, REP8-038].

Both SEP and DEP are situated 112km and 116km respectively from the Flamborough and Filey Coast SPA boundary at the nearest point. This is beyond the mean maximum foraging range of guillemot during the breeding period. Consequently there is no connectivity between the breeding population and the Project during the breeding season.

The Applicant calculated that the annual guillemot mortality from displacement and disturbance from DEP alone to be between 2 and 46 (95% CI 1 – 75) individuals and from SEP alone to be between 0 – 3 (95% CI 0 – 5) individuals. Combined, the Project is estimated to cause an annual mortality of between 2 and 49 (95% CI 1 and 80) individuals. These were based on a range of displacement rates from 30% and 70% and mortality ranging from 1% and 10%. The combined Project total increases the baseline mortality to between 0.03 and 0.66% (95% CI 0.02 – 1.08) [APP-059].

The Applicant proposed the use of 50% displacement and 1% mortality rates for assessing displacement effects. NE proposed the use of a range of displacement and mortality rates as presented above [REP5-093].

NE agree that under all scenarios the estimated impacts from the Project alone are below that at which an AEoI is predicted to arise [REP8-102]

The potential mortality arising from in-combination displacement effects was estimated to be between 132 and 3,079 individuals per year. The median Counterfactual Growth Rate ranged from between 0.972 and 0.999 and the median Counterfactual Population Size was estimated to be between 0.308 and 0.952, depending on the level of displacement and mortality predicted to occur [APP-059 Table 9-111 and 9-112].

Following advice from NE these figures were revised to include the NE preferred standard approach and the NE preferred bespoke approach used for the HP4 [REP5-043, REP8-38]. All three approaches provide differing levels of mortality:

- 102 to 2,391 (HP4 Applicant's approach))
- 112 to 2,608 (HP4 Natural England 'standard approach')
- 176 to 4,099 (HP4 Natural England 'bespoke approach')

The estimated increase in baseline mortality of Flamborough and Filey Coast SPA breeding adult guillemot due to in-combination displacement impacts is between:

- 1.38% and 32.19% (HP4 Applicant's approach)
- 1.51% and 35.12% (HP4 Natural England 'standard approach')
- 2.37% and 55.19% (HP4 Natural England 'bespoke approach'

The estimated median counterfactual of growth rate due to in-combination displacement impacts is between:

- 0.987 and 0.999 (HP4 Applicant's approach)
- 0.986 and 0.999 (HP4 Natural England 'standard approach')
- 0.978 and 0.999 (HP4 Natural England 'bespoke approach'

The estimated median counterfactual of final population size due to in-combination displacement impacts is between:

- 0.586 and 0.977 (HP4 Applicant's approach)
- 0.559 and 0.975 (HP4 Natural England 'standard approach')
- 0.402 and 0.961 (HP4 Natural England 'bespoke approach'

For the same estimated levels of impact NE provide differing figures for the counterfactual of the growth rate and counterfactual of final population size for their two preferred approaches [REP8-102, Table 5].

The estimated median counterfactual of growth rate due to in-combination displacement impacts is between:

- 0.976 and 0.999 (HP4 Natural England 'standard approach')
- 0.972 and 0.998 (HP4 Natural England 'bespoke approach'

The estimated median counterfactual of final population size due to in-combination displacement impacts is between:

- 0.365 and 0.952 (HP4 Natural England 'standard approach')
- 0.308 and 0.961 (HP4 Natural England 'bespoke approach'

NE estimate an in-combination annual mortality of 1,498 guillemot (based on 70% displacement and 2% mortality rate), resulting in a reduction in population growth rate of 1.4% and reduction in final population size of 54.3% [REP8-102].

NE are not confident that the future population growth rates at Flamborough and Filey Coast SPA could sustain the predicted level of mortality and consequently NE concluded that it is not possible to rule out AEoI of the guillemot feature of the Flamborough and Filey Coast SPA for displacement impacts in-combination with other plans and projects.

The ExA notes the previous position of the Secretary of State regarding in-combination impacts on guillemot arising from the HP4, where an AEoI could not be ruled out for similar scale of impact on the same qualifying feature at the same designated site [ER 26.8.67].

The ExA concludes that an AEoI on the guillemot feature of the Flamborough and Filey Coast SPA cannot be ruled out for displacement impacts in-combination with other plans or projects [ER 28.8.68].

The Secretary of States conclusions are presented in Table 3.

4.4.5.4 Razorbill

The Applicant concluded no AEoI alone or in-combination to razorbill from displacement/barrier effects during the breeding and non-breeding season [APP-059, REP8-038].

Both DEP and SEP are situated 112km and 116km respectively from the Flamborough and Filey Coast SPA boundary at the nearest point. This is beyond the mean maximum foraging range of razorbill during the breeding period but within the mean maximum foraging range plus one standard deviation, and the maximum foraging range.

The Applicant calculated the annual razorbill mortality from displacement and disturbance within their application [APP-059]. These figures were subsequently corrected and revised by the Applicant.

from DEP alone to be between 0 and 16 (95% CI 0 – 28) individuals and from SEP alone to be between 0 – 5 (95% CI 0 – 8) individuals. Combined, the Project is estimated to cause an annual mortality of between 1 and 21 (95% CI 0 and 35) individuals. These were based on a range of displacement rates from 30% and 70% and mortality ranging from 1% and 10%. The combined Project total increases the baseline mortality to between 0.02 and 0.49% (95% CI 0.01 – 0.83).

The Applicant proposed the use of 50% displacement and 1% mortality rates for assessing displacement effects, which would suggest an annual mortality of 1 bird at DEP and no birds at SEP; a combined Project total of 1 bird (95% CI 0 – 2). NE proposed the use of a range of displacement and mortality rates as presented above [REP5-093].

NE agree that under all scenarios the estimated impacts from the Project alone are below that at which an AEoI is predicted to arise [REP8-102].

The potential mortality arising from in-combination displacement effects was estimated to be between 22 and 502 razorbill per year. The median counterfactual for growth rate ranged from between 0.985 and 0.999 and the median counterfactual for population size was estimated to be between 0.546 and 0.975, depending on the level of displacement and mortality predicted to occur [APP-059, Table 9-122].

Following advice from NE these figures were revised to include the NE preferred standard approach and the NE preferred bespoke approach as used for the HP4 [REP5-043, REP8-38]. All three approaches provide differing levels of mortality:

- 21 to 488 (HP4 Applicant's approach))
- 21 to 500 (HP4 Natural England 'standard approach')
- 30 to 689 (HP4 Natural England 'bespoke approach')

The estimated increase in baseline mortality of Flamborough and Filey Coast SPA breeding adult guillemot due to in-combination displacement impacts is between:

- 0.49% and 11.48% (HP4 Applicant's approach)
- 0.50% and 11.76% (HP4 Natural England 'standard approach')
- 0.69% and 16.21% (HP4 Natural England 'bespoke approach'

The estimated median counterfactual of growth rate due to in-combination displacement impacts is between:

- 0.986 and 0.999 (HP4 Applicant's approach)
- 0.992 and 1.000 (HP4 Natural England 'standard approach')
- 0.989 and 0.999 (HP4 Natural England 'bespoke approach'

The estimated median counterfactual of final population size due to in-combination displacement impacts is between:

- 0.556 and 0.975 (HP4 Applicant's approach)
- 0.710 and 0.986 (HP4 Natural England 'standard approach')
- 0.624 and 0.980 (HP4 Natural England 'bespoke approach'

For the same estimated levels of impact NE provide differing figures for the counterfactual of the growth rate and counterfactual of final population size for their two preferred approaches [REP8-102, Table 6].

The estimated median counterfactual of growth rate due to in-combination displacement impacts is between:

- 0.985 and 0.999 (HP4 Natural England 'standard approach')
- 0.985 and 0.999 (HP4 Natural England 'bespoke approach'

The estimated median counterfactual of final population size due to in-combination displacement impacts is between:

- 0.546 and 0.975 (HP4 Natural England 'standard approach')
- 0.546 and 0.966 (HP4 Natural England 'bespoke approach'

NE estimate an in-combination annual mortality of 206 razorbill (based on 70% displacement and 2% mortality rate), resulting in a reduction in population growth rate of 0.6% and reduction in final population size of 22.7% [REP8-102].

NE are not confident that the future population growth rates at Flamborough and Filey Coast SPA could sustain the predicted level of mortality and consequently NE concluded that it is not possible to rule out AEoI of the razorbill feature of the Flamborough and Filey Coast SPA for displacement impacts in-combination with other plans and projects [REP8-102].

The ExA notes the previous position of the Secretary of State regarding in-combination impacts on razorbill arising from the HP4, where an AEoI could be ruled out for similar scale of impact on the same qualifying feature at the same designated site [ER 26.8.80].

The ExA concludes that an AEoI on the razorbill feature of the Flamborough and Filey Coast SPA can be ruled out for displacement impacts for the Project alone and in-combination with other plans or projects [ER 28.8.81].

The Secretary of States conclusions are presented in Table 3.

4.4.5.5 Seabird assemblage

The Applicant concluded no AEoI to the seabird assemblage of the Flamborough and Filey Coast SPA from the Project alone or in-combination with plans or projects [APP-059, REP4-011]. The

Applicant [REP3-103] was also of the view that where individual species compensatory measures are agreed to be appropriate, further compensation would not be needed for the assemblage.

The seabird assemblage for the Flamborough and Filey Coast SPA comprises nine species:

- Gannet
- Kittiwake
- Guillemot
- Razorbill
- Fulmar
- Puffin
- Herring gull
- Cormorant
- Shag

The Applicant concluded that there would be no LSE arising from the Project alone or in-combination with other plans or projects to: fulmar, herring gull cormorant, shag and puffin [APP-060]. Having screened out these species no further assessment was undertaken on them in the RIAA [APP-059].

Fulmar were screened out on the basis of the relatively low numbers from this SPA predicted to be impacted by the Project and their low sensitivity to wind farm impacts. Approximately 0.3% of the birds present during the autumn and spring migration season are predicted to be from this SPA [APP-060, REP8-038].

Herring gull were screened out on the basis that the Project array area lies beyond the mean maximum foraging range of this species during the breeding season and therefore there would not be any direct impact on breeding birds during this period. The estimated number of collisions per year apportioned to the Flamborough and Filey Coast SPA is estimated to be 0.0016 birds [APP-060, REP8-038].

Cormorant and shag were screened out on the basis that the Project array area is beyond the mean maximum foraging range for these two species during the breeding period. Neither species occur in the Project array area during the non-breeding period [APP-060].

Puffin was screened out by the Applicant on the basis that it was not species identified as occurring within the mean maximum or maximum foraging ranges during the breeding season and that approximately 0.4% of the birds present during the non-breeding season would be from the Flamborough and Filey Coast SPA [APP-060].

NE requested that an assessment be undertaken of the potential effects of the Project on the seabird assemblage feature of Flamborough and Filey Coast SPA and specifically advised that as a component species of the seabird assemblage that puffin should be included [RR-063].

4.4.5.6 Gannet and kittiwake collision mortality

The assessment of collision impacts on gannet are presented in Section 4.4.5.1

The assessment of collision impacts on kittiwake are presented in Section 4.4.5.2.

4.4.5.7 Gannet, guillemot and razorbill displacement and disturbance mortality

The assessment of displacement impacts on gannet are presented in Section 4.4.5.1.

The assessment of displacement impacts on guillemot are presented in Section 4.4.5.3.

The assessment of displacement impacts on razorbill are presented in Section 4.4.5.4.

4.4.5.8 Puffin

The Applicant calculated an annual mortality of 0.9 puffins from the Project [REP7-085, Section 4]. The Applicant's population modelling results [REP6-026, Table 48] concluded there would be no AEoI on the SPA puffin population [REP7-085, Table 11].

The Applicant calculated the annual puffin mortality from displacement and disturbance [REP2-036] from DEP alone to be between 0 and 0 (95% CI 0 – 0.09) individuals and from SEP alone to be between 0 – 0 (95% CI 0 – 0.04) individuals. Combined, the Project is estimated to cause an annual mortality of between 0 and 0 (95% CI 0 and 0.13) individuals. These were based on a range of displacement rates from 30% and 70% and mortality ranging from 1% and 10%. The combined Project total does not produce a measurable increase in puffin mortality [REP2-036]. On the basis that there is no measurable impact from the Project alone on puffin the Applicant concluded that there would not be an in-combination effect.

NE agreed that, with regards to potential impacts on puffin, under all scenarios the estimated impacts from the Project alone and in-combination are below that at which an AEoI is predicted to arise [REP8-102].

4.4.5.9 Seabird Assemblage conclusions

NE advised that it is unable to rule out an AEoI regarding the seabird assemblage on the basis of conclusion reached for individual species components of the Assemblage (namely kittiwake, guillemot and razorbill) and in line with the conclusions reached for HP4. However, NE do note that species specific compensation for the relevant component species, once fully agreed, would also meet the required compensation for the seabird assemblage as a whole, and no stand-alone compensation proposal is required [REP8-102].

The RSPB have stated that an AEoI cannot be ruled out for in-combination impacts to the Seabird Assemblage feature for the project in-combination due to the estimated impacts to kittiwake, gannet, guillemot and razorbill that are also component species of the SPA on their own.

The ExA concluded that as an in-combination AEoI has previously been concluded for kittiwake and guillemot and that these species are also components of the Seabird Assemblage, it follows that an AEoI cannot be ruled out for the Seabird Assemblage feature of the Flamborough and Filey Coast SPA [ER 26.8.92].

The Secretary of States conclusions are presented in Table 3.

4.5 Appropriate Assessment: protected sites conclusions

Table 3 presents the Secretary of State's conclusions on protected sites. The ExA recommendations are referenced and documented in the table where applicable.

The Secretary of State has concluded that the Project alone and in-combination would not result in an AEoI of any protected sites except:

- Greater Wash SPA – sandwich tern; AEoI could not be ruled out for in-combination collision mortality.
- North Norfolk Coast SPA and Ramsar Site – sandwich tern; AEoI could not be ruled out for in-combination collision mortality.
- Flamborough and Filey Coast SPA – kittiwake; AEoI could not be ruled out for in-combination collision mortality.
- Flamborough and Filey Coast SPA – guillemot; AEoI could not be ruled out for in-combination disturbance and displacement impacts.

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Table 3: Secretary of State's conclusions on protected sites

Protected Site	Qualifying Feature	Effect pathway	Views of IPs and the ExA	Secretary of State's conclusion
Inner Dowsing, Race Bank and North Ridge SAC	Sandbanks which are slightly covered by seawater all the time.	Potential effects from changes to bedload sediment transport from only SEP OWF infrastructure (not DEP).	See Section 4.1.1 ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.6.6].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Inner Dowsing, Race Bank and North Ridge SAC can be excluded for the Project alone and in-combination
Southern North Sea SAC	Harbour porpoise	Potential effects from: • underwater noise, • barrier effects from underwater noise; • vessel interactions; • changes to water quality; changes to prey availability.	See Section 4.2.1 ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.7.33].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Southern North Sea SAC can be excluded for the Project alone and in-combination. The Secretary of State agrees with the MMO and ExA that the SIP mechanism provides sufficient control over the timing and nature of noisy activities to ensure that the relevant in-combination disturbance impact thresholds for marine mammals would not be breached.
Moray Firth SAC	Bottlenose dolphin	Potential effects from: • underwater noise; • barrier effects from underwater noise; • vessel interactions; • changes to water quality; changes to prey availability.	See Section 4.2.2 ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.7.37].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Moray Firth SAC can be excluded for the Project alone and in-combination.
Humber Estuary SAC	Grey Seal	Potential effects from: • underwater noise; • barrier effects from underwater noise; • vessel interactions; • changes to water quality; changes to prey availability.	See section 4.2.3 ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.7.46].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Humber Estuary SAC can be excluded for the Project alone and in-combination.
The Wash and North Norfolk Coast SAC	Sandbanks which are slightly covered by seawater all the time	Potential effects on sandbanks from changes to bedload sediment transport from cable protection	See Section 4.1.2 ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.6.11].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Wash and North Norfolk Coast SAC can be excluded for the Project alone and in-combination.
	Harbour seal	Potential effects from: • underwater noise; • barrier effects from underwater noise; • vessel interactions; • disturbance at seal haul-out sites; • disturbance of foraging seals at sea; • changes to water quality; changes to prey availability.	See Section 4.2.4 ExA recommended that AEoI can be excluded both alone and in-combination [ER 26 7 61].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Wash and North Norfolk Coast SAC can be excluded for the Project alone and in-combination.

Berwickshire and North Northumberland Coast SAC	Grey seal	Potential effects from: • underwater noise; • barrier effects from underwater noise; • vessel interactions; • changes to water quality; changes to prey availability.	See Section 4.2.5 ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.7.50].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Berwickshire and North Northumberland Coast SAC can be excluded for the Project alone and in-combination
River Wensum SAC	Watercourses of plain to montane levels with *R. fluitantis* and *Callitricho-Batrachion* vegetation.	Potential for both direct and indirect effects upon both the features of the site and the supporting habitats.	See Section 4.3.1 ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.5.13].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the River Wensum SAC can be excluded for the Project alone and in-combination
	White-clawed crayfish, Desmoulin's whorl snail, Brook lamprey, Bullhead	Should there be a 'bentonite break out', there could be a release of the drilling fluid into the river.	See Section 4.3.1 ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.5.13].	
North Norfolk Coast SPA and Ramsar	Dark-bellied Brent goose, Knot, Pintail, Wigeon.	Potential risk of collision during migratory flights to and from the site.	See Section 4.4.1.1 No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.126].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that with regards to dark-bellied brent goose, knot, pintail and wigeon an AEoI of the North Norfolk Coast SPA and Ramsar can be excluded for the Project alone and in-combination.
	Common tern	Potential risk of collision from SEP and DEP during the breeding season.	See Section 4.4.1.1 No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.124].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that with regards to common tern an AEoI of the North Norfolk Coast SPA and Ramsar can be excluded for the Project alone and in-combination.
	Pink-footed goose	Potential risk of collision during migratory flights to and from the site. Direct effects on wintering birds present in ex-situ habitats/ functionally linked land of the SPA and Ramsar.	See Section 4.4.1.2 ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.5.24].	Having secured an appropriate Requirement for a standalone scheme of mitigation for Pink-footed Goose in the DCO to be agreed by the relevant local authority in consultation with NE as the SNCB and having had regard to the Applicants case other mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, the Secretary of State is satisfied that an AEoI of the North Norfolk Coast SPA and Ramsar can be excluded for the Project alone and in-combination due to impacts on pink-footed goose
	Sandwich tern	Potential risk of collision and displacement/barrier effects during the breeding and non-breeding (spring and autumn migration) seasons.	See Section 4.4.1.3. ExA recommended that AEoI can be excluded from the Project alone [ER 26.8.122] ExA recommended that AEoI cannot be excluded from the Project in-combination with other plans or projects [ER 26.8.122].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that with regards Sandwich tern an AEoI of the North Norfolk Coast SPA and Ramsar can be excluded for the Project alone. The Secretary of State considers that an AEoI of the North Norfolk Coast SPA and Ramsar cannot be excluded in-combination with other plans or projects.
Greater Wash SPA	Common tern	Potential risk of collision effects during the breeding season.	See Section 4.4.2.2	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in

			No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.107].	the DCO, the views of all IPs and the recommendation of the ExA, that with regards to common tern an AEoI of the Greater Wash SPA can be excluded for the Project alone and in-combination.
	Little gull	Potential risk of collision effects during the breeding season	See Section 4.4.2.1 Following receipt of updated information [REP2-036] NE agreed that there would be no AEoI alone or in-combination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.110].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that with regards to little gull an AEoI of the Greater Wash SPA can be excluded for the Project alone and in-combination.
	Sandwich tern	Potential risk of collision effects during the breeding season	See Section 4.4.2.3 ExA recommended that AEoI can be excluded from the Project alone [ER 26.8.105 and ER 26.8.122] ExA recommended that AEoI cannot be excluded from the Project in-combination with other plans or projects [ER 26.8.105 and ER 26.8.122].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that with regards Sandwich tern an AEoI of the Greater Wash SPA can be excluded for the Project alone. The Secretary of State considers that an AEoI of the Greater Wash SPA cannot be excluded in-combination with other plans or projects.
	Red-throated diver	Potential risk of displacement/barrier effects.	See Section 4.4.2.4 ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.104].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that with regards to red-throated diver an AEoI of the Greater Wash SPA can be excluded for the Project alone and in-combination.
Outer Thames Estuary SPA	Red-throated diver	Potential risk of displacement and barrier effects during the non-breeding season.	See Section 4.4.3.1 ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.132].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Outer Thames Estuary SPA can be excluded for the Project alone and in-combination.
Alde-Ore Estuary SPA and Ramsar Site	Lesser black-backed gull	Potential risk of collision during the breeding and non-breeding (autumn migration, winter and spring migration seasons)	See Section 4.4.4.1 ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.21].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Ald-Ore Estuary SPA and Ramsar can be excluded for the Project alone and in-combination
Breydon Water SPA and Ramsar Site	Bewick's swan, Avocet, Golden plover, Lapwing, Ruff, Waterbird assemblage	Potential risk of collision during migratory flights to and from the site	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Breydon Water SPA and Ramsar Site can be excluded for the Project alone and in-combination
The Wash SPA and Ramsar Site	Bar-tailed godwit, Bewick's swan, Black-tailed godwit, Common scoter, Curlew, Dark-	Potential risk of collision during migratory flights to and from the site	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation

	bellied brent goose, Dunlin, Gadwall, Goldeneye, Golden plover, Grey plover, Knot, Lapwing, Oystercatcher, Pink-footed goose, Pintail, Redshank, Ringed plover, Sanderling, Shelduck, Turnstone, Wigeon, Waterbird Assemblage			of the ExA, that an AEoI of The Wash SPA and Ramsar Site can be excluded for the Project alone and in-combination
Gibraltar Point SPA and Ramsar Site	Bar-tailed godwit, Dark-bellied brent goose, Grey plover, Sanderling, Waterbird Assemblage	Potential risk of collision during migratory flights to and from the site.	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Gibraltar Point SPA and Ramsar Site can be excluded for the Project alone and in-combination.
Humber Estuary SPA and Ramsar Site	Avocet, Bar-tailed godwit, Bittern,Black-tailed godwit, Dunlin, Golden plover, Knot, Redshank, Ruff, Shelduck, Waterbird Assemblage.	Potential risk of collision during migratory flights to and from the site.	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Humber Estuary SPA and Ramsar Site can be excluded for the Project alone and in-combination.
Broadland SPA and Ramsar Site	Bewick's swan, Gadwall, Ruff, Shoveler, Whooper swan, Wigeon	Potential risk of collision during migratory flights to and from the site	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Broadland SPA and Ramsar Site can be excluded for the Project alone and in-combination.
Ouse Washes SPA and Ramsar Site	Bewick's swan, Black-tailed godwit, Gadwall, Garganey, Pintail, Pochard, Ruff, Shoveler, Teal, Whooper swan, Wigeon, Waterbird Assemblage	Potential risk of collision during migratory flights to and from the site	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Ouse Washes SPA and Ramsar Site can be excluded for the Project alone and in-combination.
Minsmere-Walberswick SPA and Ramsar Site	Avocet, European white-fronted goose, Gadwall, Shoveler, Teal, Breeding bird Assemblage	Potential risk of collision during migratory flights to and from the site.	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Minsmere-Walberswick SPA and Ramsar Site can be excluded for the Project alone and in-combination.
Nene Washes SPA and Ramsar Site	Bewick's swan, Black-tailed godwit, Shoveler, Teal, Whooper Swan, Wigeon	Potential risk of collision during migratory flights to and from the site	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Nene Washes SPA and Ramsar Site can be excluded for the Project alone and in-combination.
Flamborough and Filey Coast SPA	Gannet	Potential risk of collision and displacement/barrier effects during the breeding and non-breeding (autumn migration and spring migration) seasons.	See Section 4.4.5.1 ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.50].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation

				of the ExA, that with regards to gannet an AEoI of the Flamborough and Filey Coast SPA can be excluded for the Project alone and in-combination.
	Kittiwake	Potential risk of collision during the breeding and non-breeding (autumn migration and spring migration) seasons	See Section 4.4.5.2 ExA recommended that AEoI can be excluded from the Project alone [ER 26.8.33] ExA recommended that AEoI cannot be excluded from the Project in-combination with other plans or projects [ER 26.8.34].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that with regards kittiwake an AEoI of the Flamborough and Filey Coast SPA can be excluded for the Project alone. The Secretary of State considers that an AEoI of the Flamborough and Filey Coast SPA cannot be excluded in-combination with other plans or projects.
	Guillemot	Potential risk of displacement/barrier effects during the breeding and non-breeding seasons	See Section 4.4.5.3 ExA recommended that AEoI can be excluded from the Project alone [ER 26.8.67] ExA recommended that AEoI cannot be excluded from the Project in-combination with other plans or projects [ER 26.8.68].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that with regards guillemot an AEoI of the Flamborough and Filey Coast SPA can be excluded for the Project alone. The Secretary of State considers that an AEoI of the Flamborough and Filey Coast SPA cannot be excluded in-combination with other plans or projects.
	Razorbill	Potential risk of displacement/barrier effects during the breeding and non-breeding (autumn migration, winter and spring migration) seasons.	See Section 4.4.5.4 ExA recommended that AEoI can be excluded from the Project alone and in-combination [ER 26.8.81].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that with regards to razorbill an AEoI of the Flamborough and Filey Coast SPA can be excluded for the Project alone and in-combination.
	Seabird Assemblage[27]	Potential risk of collision and displacement/barrier effects during the breeding and non-breeding (autumn migration and spring migration) seasons	See Section 4.4.5.5. ExA recommended that AEoI can be excluded from the Project alone. ExA recommended that AEoI cannot be excluded from the Project in-combination with other plans or projects [ER 26.8.92].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that with regards Seabird Assemblage an AEoI of the Flamborough and Filey Coast SPA can be excluded for the Project alone. The Secretary of State is satisfied that with regards to Seabird Assemblage an AEoI of the Flamborough and Filey Coast SPA cannot be excluded in-combination with other plans or projects. The Secretary of State notes that advice from NE relating to proposed compensation for qualifying features of this site and the proposed compensation measures being applied mean that no specific additional compensatory measures are required.

[27] Following advice from NE [RR-063] the seabird assemblage for the Flamborough and Filey Coast SPA was screened in to the assessment [REP2-037, REP4-009].

Coquet Island SPA	Sandwich tern	Potential risk of collision and displacement/barrier effects during the non-breeding season (autumn migration and spring migration).	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Coquet Island SPA can be excluded for the Project alone and in-combination.
	Common tern, Arctic tern	Potential risk of collision during the non-breeding season (autumn migration and spring migration)		
Farne Islands SPA	Arctic tern	Potential risk of collision during the non-breeding season (autumn migration and spring migration)	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Farne Islands SPA can be excluded for the Project alone and in-combination.
	Sandwich tern	Potential risk of collision and displacement/barrier effects during the non-breeding season (autumn migration and spring migration).		
	Guillemot	Potential risk of displacement/barrier effects during non-breeding seasons.		
	Seabird assemblage (including puffin)	Potential risk of collision and/or displacement and barrier effects during the non-breeding season (autumn migration, spring migration and non-breeding season).		
St Abbs Head to Fast Castle SPA	Seabird assemblage (guillemot)	Potential risk of displacement during the non-breeding season	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the St Abb's Head to Fast Castle SPA can be excluded for the Project alone and in-combination.
Forth Islands SPA	Gannet	Potential risk of collision and displacement/barrier effects during the non-breeding season (autumn migration and spring migration)	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Forth Islands SPA can be excluded for the Project alone and in-combination.
	Lesser black-backed gull	Potential risk of collision during the non-breeding season (autumn migration, winter and spring migration)		
	Puffin	Potential risk of displacement/barrier effects during the non-breeding season		
Imperial Dock Lock, Leith SPA	Common tern	Potential risk of collision during the non-breeding season (autumn migration and spring migration).	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Imperial Dock Lock, Leith SPA can be excluded for the Project alone and in-combination.
Fowlsheugh SPA	Guillemot	Potential risk of displacement/barrier effects during the non-breeding season	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Fowlsheugh SPA can be excluded for the Project alone and in-combination.
	Kittiwake	Potential risk of collision during the non-breeding season (autumn migration and spring migration).		
Ythan Estuary, Sands of Forvie and Meikle Loch SPA and Ramsar Site	Sandwich tern	Potential risk of collision and displacement/barrier effects during the non-breeding season (autumn migration and spring migration).	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Ythan Estuary, Sands of Forvie and Meikle Loch SPA and Ramsar Site can be excluded for the Project alone and in-combination.

Troup, Pennan and Lion's Heads SPA	Kittiwake	Potential risk of collision during the non-breeding season (autumn migration and spring migration)	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Troup, Pennan and Lion's Heads SPA can be excluded for the Project alone and in-combination.
	Guillemot	Potential risk of displacement/barrier effects during the non-breeding season.		
East Caithness Cliffs SPA	Guillemot	Potential risk of displacement/barrier effects during the non-breeding season.	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the East Caithness Cliffs SPA can be excluded for the Project alone and in-combination.
	Kittiwake	Potential risk of collision during the non-breeding season (autumn migration and spring migration).		
	Razorbill	Potential risk of displacement/barrier effects during the non-breeding season (autumn migration, winter and spring migration).		
North Caithness Cliffs SPA	Guillemot	Potential risk of displacement/barrier effects during the non-breeding season.	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the North Caithness Cliffs SPA can be excluded for the Project alone and in-combination.
Hoy SPA	Red-throated diver,	Potential risk of displacement/barrier effects during the non-breeding season (autumn migration, winter and spring migration).	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Hoy SPA can be excluded for the Project alone and in-combination.
Auskerry SPA	Arctic tern	Potential risk of collision during the non-breeding season (autumn migration and spring migration).	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Auskerry SPA can be excluded for the Project alone and in-combination.
Marwick Head SPA	Guillemot	Potential risk of collision during the non-breeding season (autumn migration and spring migration).	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Marwick Head SPA can be excluded for the Project alone and in-combination.
West Westray SPA	Guillemot	Potential risk of displacement/barrier effects during the non-breeding season.	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the West Westray SPA can be excluded for the Project alone and in-combination.
Fair Isle SPA	Guillemot	Potential risk of displacement/barrier effects during the non-breeding season. [COLLISION?]	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Fair Isle SPA can be excluded for the Project alone and in-combination.

Noss SPA	Gannet	Potential risk of collision and displacement/barrier effects during the non-breeding season (autumn migration and spring migration).	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Noss SPA can be excluded for the Project alone and in-combination.
	Guillemot	Potential risk of displacement/barrier effects during the non-breeding season.		
East Mainland Coast Shetland SPA	Red-throated diver	Potential risk of displacement/barrier effects during the non-breeding season (autumn migration, winter and spring migration).	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the East Mainland Coastal Shetland SPA can be excluded for the Project alone and in-combination.
Foula SPA	Guillemot, Puffin	Potential risk of displacement/barrier effects during the non-breeding season.	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Foula SPA can be excluded for the Project alone and in-combination.
	Red-throated diver	Potential risk of displacement/barrier effects during the non-breeding season (autumn migration, winter and spring migration).		
Papa Stour SPA	Arctic tern	Potential risk of collision during the non-breeding season (autumn migration and spring migration).	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Papa Stour SPA can be excluded for the Project alone and in-combination.
Ronas Hill – North Roe and Tingon SPA	Red-throated diver	Potential risk of displacement/barrier effects during the non-breeding season (autumn migration, winter and spring migration).	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Ronas Hill – North Roe and Tingon SPA can be excluded for the Project alone and in-combination.
	Great skua	Potential risk of displacement/barrier effects during the autumn migration season.		
Hermaness, Saxa Vord and Valla Field SPA	Gannet, Great skua	Potential risk of collision and displacement/barrier effects during the non-breeding season (autumn migration and spring migration).	No concerns raised during Examination. ExA recommended that AEoI can be excluded both alone and in-combination [ER 26.8.10].	The Secretary of State is satisfied, having had regard to the Applicants case and mitigation measures secured in the DCO, the views of all IPs and the recommendation of the ExA, that an AEoI of the Papa Stour SPA can be excluded for the Project alone and in-combination.

5 Appropriate Assessment conclusions

As the competent authority for energy NSIPs as defined under the Planning Act 2008, the Secretary of State has undertaken an AA under Regulation 63 of the Habitats Regulations and Regulation 28 of the Offshore Habitats Regulations. The Secretary of State has undertaken an AA in respect of the conservation objectives of 35 protected sites to determine whether the Project, either alone or in-combination with other plans or projects, will result in an adverse effect on site integrity.

The Secretary of State has carefully considered all of the information available to her, including the advice from the SNCB, the recommendations of the ExA and the views of all IPs, including the Applicant.

The Secretary of State is satisfied that, given the relative scale and magnitude of the identified effects on the qualifying features of the protected sites and where relevant, the measures in place to avoid or reduce potential adverse effects secured in the DCO and DML, there would not be any implications for the achievement of site conservation objectives and therefore adverse effects on site integrity can be excluded for:

- Humber Estuary SAC
- Inner Dowsing, Race Bank and North Ridge SAC
- River Wensum SAC;
- Alde-Ore Estuary SPA and Ramsar,
- Auskerry SPA,
- Breydon Water SPA and Ramsar,
- Broadland SPA and Ramsar,
- Coquet Island SPA,
- East Caithness Cliffs SPA,
- East Mainland Coast, Shetland SPA,
- Fair Isle SPA,
- Farne Islands SPA,
- Forth Islands SPA,
- Foula SPA,
- Fowlsheugh SPA,
- Gibraltar Point SPA and Ramsar,
- Greater Wash SPA,
- Hermaness, Saxa Vord and Valla Field SPA.
- Hoy SPA,
- Humber Estuary SPA and Ramsar,
- Imperial Dock Lock, Leith SPA,
- Marwick Head SPA,
- Southern North Sea SAC
- The Wash and North Norfolk Coast SAC
- Moray Firth SAC;
- Minsmere-Walberswick SPA and Ramsar,
- Nene Washes SPA and Ramsar,
- North Caithness Cliffs SPA,
- North Norfolk Coast SPA and Ramsar,
- Noss SPA,
- Ouse Washes SPA and Ramsar,
- Outer Thames Estuary SPA,
- Papa Stour SPA,
- Ronas Hill – North Roe and Tingon SPA,
- St Abbs Head to Fast Castle SPA,
- The Wash SPA and Ramsar,
- Troup, Pennan and Lion's Heads SPA,
- West Westray SPA,
- Ythan Estuary, Sands of Forvie and Meikle Loch SPA (and SPA extension) and Ramsar

However, the Secretary of State agrees with the ExA, in accordance with the advice of NE, that AEoI cannot be ruled out beyond reasonable scientific doubt in relation to:

- collision mortality of kittiwake of the Flamborough and Filey Coast SPA, in combination with other projects;
- displacement and disturbance of guillemot of the Flamborough and Filey Coast SPA, in combination with other projects;
- collision mortality of sandwich tern of the North Norfolk Coast SPA, in combination with other projects; and
- collision mortality of sandwich tern of the Greater Wash SPA, in combination with other projects.

The Secretary of State has not identified any further mitigation measures that could reasonably be imposed which would avoid or mitigate the potential AEoI identified and has therefore proceeded to consider the derogation provisions of the Habitats Regulations, as presented in Sections 6 to 9 below.

6 Consideration of case for Derogation

Based on the AA, the Secretary of State cannot conclude, beyond all reasonable scientific doubt, the absence of an adverse effect from the Project in-combination on the integrity of the Flamborough and Filey Coast SPA, the Greater Wash SPA and the North Norfolk Coast SPA. The Secretary of State concludes that the Project does not meet the integrity test. The Secretary of State has therefore decided to review 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.

Regulation 64 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 AEoI of a protected site. Consent may only be given where no alternative solutions to the project are available which are less damaging to the affected protected site and where Regulation 68 is satisfied. Regulation 68 requires the appropriate authority to secure any necessary compensatory measures to ensure that the overall coherence of the UK NSN is protected. The Secretary of State's consideration of information provided to inform these further tests are presented in subsequent Sections alongside her conclusions.

This part of the HRA 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 NSN is protected have been assessed.

7 Assessment of alternative solutions

The Secretary of State has identified the objectives of the Project and has considered whether these objectives could be met by any feasible alternative solutions with a lesser impact on protected sites.

The Applicant provided a 'no alternative solutions' case [APP-063 section 4]. It is stated to have been prepared in accordance with a range of guidance published by Defra and the European Commission [APP-063, Paragraph 37]. The Applicant's case also refers to the HRAs produced by the Secretary of State for the Hornsea 3, Norfolk Boreas and Norfolk Vanguard DCO decisions.

The Applicant structured its case on alternative solutions around five stages:

- Stage 1: Describing the need and objectives for the Project.
- Stage 2: Quantifying the extent of AEoI to the SPAs listed above to determine if any alternative solutions would be less harmful to the sites.
- Stage 3: Screening a long list of potential alternative solutions to produce a shortlist of alternative solutions which could also deliver the objectives identified for the Project.
- Stage 4: Consideration of the shortlist of alternative solutions to establish if any of them represent a feasible alternative to the Project.
- Stage 5: Consideration of any feasible alternatives identified to establish if any of these would have a lesser effect on the integrity of the NSN.

7.1 Project objectives

The Applicant's case for the need of the project is based on three strands: the need to reduce greenhouse gas (GHG) emissions; the need for energy security; and the urgency of the need for low carbon electricity capacity.

The Applicant's case for the need to GHG emissions is centred on the UK's commitments to reduce carbon emissions by 57% by 2032 compared to emission levels in 1990. This was agreed in the Framework Convention on Climate Change (2015) ('the Paris agreement'), the advice from the Climate Change Committee in 2019 was that 75 Gigawatts of offshore wind energy may be required to reach net zero by 2050 and the British Energy Security Strategy 2022 (BESS) including a target of 50GW of operational offshore wind generation by 2030. The Applicant also noted the emphasis in NPS EN1 on the need for the rapid development of low carbon energy sources to support decarbonisation of the UK's electricity supply, a point also made in the draft NPS EN1. The two offshore wind farms would each generate over 100 MWs each.

The Applicant refers to the 2021 Progress Report from the Climate Change Committee which predicts an increase of around 1.5°C in UK summer temperatures by 2050 set against a global change of 2.7°C. The assessment of the climate risks predicted includes impacts on public health from high temperatures, increased risk and severity of flooding and extreme weather events, impacts on food security and economic impacts including effects on international trade and the viability of coastal communities.

The Applicant considers that the need to deliver energy security is supported by the expected substantial increase in electricity demand as the UK moves toward net zero as described in NPS EN1 and the draft NPS EN1.

The Applicant states that NPS EN1 predicts that 113GW of total generation will be required by 2025 of which 59GW would be new build; 33GW of that would be renewable energy generation. The draft NPS EN1 identifies a similar range of energy generation options to those described in NPS EN1. Current generation capacity in the UK is stated to stand at 76.6GW in 2021 which is significantly below the 113GW target for 2025 and a reduction in UK generating capacity from 2011 when the NPS EN1 was designated. Total renewable generation capacity is currently below the target for 2025.

The Applicant also noted the potential for the UK to benefit from further cost reductions as a result of further investment in the renewables sector. It cited the considerable reductions in the cost of offshore wind already achieved in the Contracts for Difference process.

Based on the needs case described by the Applicant, it identified the following objectives of the Project:

- **Decarbonisation**: To generate low carbon electricity from an offshore wind farm by 2030 in support of the UK target to generate 50GW of offshore wind by 2030 and associated carbon reduction targets.
- **Security of supply:** To export electricity to the UK National Grid to support UK commitments for offshore wind generation and security of supply.
- **Optimisation:** To co-ordinate and optimise generation and export capacity with the constraints of available sites and onshore transmission infrastructure whilst delivering project skills, employment and investment benefits in the Norfolk area.

In her consideration of alternatives, the Secretary of State has not constrained herself 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 allow the developer to fulfil the terms of its lease with The Crown Estate.

7.1.1 Identification of alternative solutions

The Secretary of State has considered alternative forms of energy generation in the context of the alternative solutions test and is satisfied that, in line with the 2021 joint guidance[4], alternative forms of electricity generation would not meet the objectives of the Project. Furthermore, other OWF proposals do not present an alternative solution as all available OWF projects are required in order to meet UK 2030 targets for renewable energy.

Alternatives to the Project considered by the Secretary of State are consequently limited either to ‘do nothing’ or to alternative offshore wind farm projects.

Alternative offshore wind farm projects considered are:

- Offshore wind farms not in the UK Exclusive Economic Zone (“EEZ”)
- Offshore wind farms within the UK EEZ; and
- Feasible alternative design parameters of the Project.

7.2 Consideration of alternative solutions

7.2.1 'Do Nothing'

The 'do nothing' option is dismissed on the grounds that this approach would not deliver any of the objectives for the Project or meet any of the identified needs. The Applicant notes that the 50-Gigawatt target would require the majority of offshore wind farms in the process of seeking consent to go ahead. In terms of offshore wind generating capacity, the Applicant has identified 12.3 Gigawatts from operational wind farms, with approximately 18.9 Gigawatts at the construction and pre-construction stages. A further 4.2 Gigawatts of generating capacity would be delivered by projects currently seeking consent. Another 40.1 Gigawatts of generating capacity is proposed at plan level; the Applicant notes that limited progress has been made on delivering this additional capacity and considers that significant challenges remain in achieving the 50 Gigawatts target by 2030.

The Secretary of State agrees that a compelling need in the public interest for the Project is clearly established and the 'do nothing' option is not a feasible alternative solution as it would fail to meet any of the aims and objectives of the Project in meeting such compelling need.

7.2.2 Offshore wind farms not in UK EEZ

The Secretary of State considers that offshore wind farm projects which are located outside of UK territorial waters are not an alternative to the Project since this would not meet the objective to support decarbonisation and security of the UK's energy supply by developing a large-scale offshore wind farm to optimise generation and export capacity.

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. 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.

7.2.3 Alternative locations within the UK

Within the UK, all offshore wind farms are required to secure an Agreement for Lease from the Crown Estate or Crown Estate Scotland. The Crown Estate/Crown Estate Scotland identify suitable locations for offshore wind through leasing rounds informed by HRA and Strategic Environmental Assessment. The Applicant considers that this precludes the use of sites which have not been identified through the leasing rounds.

The Applicant considers that reliance on other alternative offshore wind farms already identified within the various leasing rounds would not deliver the objectives of the Project. This is on the grounds that there is a significant time lag between the identification of suitable locations in the leasing rounds and offshore wind farms becoming operational. Despite the 40.1 Gigawatts currently identified across UK waters therefore, delivering 50 Gigawatts by 2030 remains

challenging. There is also a risk that other projects may be refused consent or developers may not proceed as has already occurred with several existing projects.

The Applicant notes the potential for the repowering of existing offshore wind farms but concludes that most would not be close to the end of their normal life span. Decisions on repowering are considered unlikely by the Applicant to be taken before that point. In addition, any plans to deliver repowering would require detailed assessment of feasibility and environmental impacts and would need to go through a detailed design, procurement and construction process. This approach would not in the Applicant's view provide an alternative solution as it is unlikely that it could deliver any additional generation capacity any more rapidly than the Project.

In summary, the Applicant considers that the 'do nothing', use of alternative locations and repowering existing offshore wind farms would not deliver the objectives of the Project, particularly the BESS target of achieving 50GW of offshore wind capacity by 2030. The Secretary of State agrees.

7.2.4 Alternative designs

Other potential alternative solutions reviewed by the Applicant relate to the design and operation of the Project. Reductions in the scale of the development could be achieved by building fewer turbines. The Applicant notes that it reduced the maximum number of turbines in response to its consultation under section 42 of the Planning Act 2008 and further review of the market. The design envelope for the Project assumes that the capacity of individual turbines ranges from 15MW to 18+MW, with the maximum number of turbines associated with the 15MW turbine capacity. However, this is stated to be the largest capacity turbine currently available on the market. In the Applicant's view reducing the number of turbines below the maximum currently proposed, would reduce the Project's contribution to the 50GW target.

The Applicant also reviewed the possibility of reducing collision risk though the use of smaller rotors to reduce the swept area but concludes that if the turbine numbers remained the same, this would reduce the generation capacity of the Project and so reduce its capacity to contribute to the 50GW target.

Restrictions on the timing of the operation to reduce risk to auk species and sandwich tern, kittiwake and gannet on migration are discounted. The Applicant considers that since the auk species would be subject to displacement effects from the presence of the turbines, there would be no benefit from seasonal restrictions on timing. The timing of peak bird migration is uncertain which makes the use of seasonal restrictions on turbine operation impractical; the Applicant also notes that the draft NPS EN-3 supports this position. Restrictions on turbine operation would also reduce the contribution of the Project to the generation of low carbon electricity.

Other alternative solutions which could have a lesser effect on the qualifying features of the SPA which the Applicant identifies are:

- reducing the array area or otherwise altering it to reduce displacement effects on auk species; and
- increasing the air gap between the rotor tips and sea level to reduce collision risk mortality for kittiwake, Sandwich tern and gannet.

The Applicant considers that these two measures do not represent feasible alternatives. The size of the array area is stated to have been driven by the minimum generating capacity required to develop an economically viable project. The Project is also required to meet the capacity density (MW installed per square kilometre) specified by the Crown Estate through the Agreement for Lease (AfL). Reducing the size of the array area by reducing the number of turbines is considered by the Applicant to make the Project financially unviable. It would also reduce the contribution which the Project could make to the 50 GW target. The Secretary of State agrees that alternative scales or designs which would reduce capacity for electricity generation would fail to meet the objectives of the Project and are not feasible alternative solutions.

Increasing the turbine density is not considered feasible because of the spacing required to avoid wake effects and interference between the turbines, the wake effect of the existing Sheringham and Dudgeon wind farms, the requirement to avoid other constraints within the existing wind farms and the need to comply with guidance from the Maritime and Coast Guard Agency.

The Applicant considers that there are several constraints which prevent the wind farm area being moved to another location within the area covered by the Applicant's AfL. These are listed as:

- existing pipelines to the north and east of the DEP North array area;
- shipping lanes to the south of the DEP South array area and to the east of the SEP;
- existing Dudgeon Offshore Windfarm export cables to the east of SEP; and
- potential for wake effects on the existing Dudgeon Offshore Windfarm.

The Applicant did however, in the interests of affording appropriate mitigation to rule out an AEoI on RTD, reduce the developable area available to the SEP array. The effective 'turbine free' zones are shown on the works plans [REP8-004] as minor reductions to the overall SEP area. No submissions have been made that the reductions impact upon the ability to realise the full development potential or operational capacity of the SEP array, nor that any project viability concerns arise [REP8-062].

In relation to increasing the air gap, the Applicant notes that this was increased from 26m to 30m above Highest Astronomical Tide following statutory consultation at the pre-application stage. This reduction is stated by the Applicant to reduce collision risk by 20% for all species and for over twice that for sandwich tern. Further increases in the air gap are considered to be technically feasible but heavily restricted by the availability of suitable turbine installation vessels. In addition, the rotor size would have to be reduced (already excluded as an alternative solution as described above) or the maximum tip height would have to be increased which would increase impacts on other aspects of the environment. These include potential aviation and visual impacts. It could also lead to an increase in the turbine footprint and scour protection requirements with concomitant effects on benthic ecology. The Applicant considers that these increased impacts would outweigh the limited benefits to ornithology. The Secretary of State agrees with the Applicant in this regard.

Aside from the reduction in the SEP area which has already been adopted by the Applicant to avoid significant impacts on red-throated diver, the Applicant does not consider that there are any feasible alternative solutions which would lead to less harm on the affected protected sites.

No objections were raised by IPs regarding this conclusion.

7.3 Conclusion

The ExA was satisfied that there are no alternative solutions that would deliver appreciable benefits in terms of reduced AEoI of the impacted SPAs. It was satisfied that alternatives to undertaking the Project on a strategic basis have been properly considered at Project inception and design levels. This conclusion does not preclude further design refinements being made following the completion of further site investigations in the post-decision stage, for example during the choice of pile foundation types. These refinements may result in reduced impacts, though no compelling evidence has been presented that they could avoid AEoI. The ExA was satisfied that the Applicant has presented a compelling case that there are no alternative solutions to the delivery of the Project.

Following a review of the information submitted by the Applicant and the recommendation of the ExA and having identified the objectives of the Project and considered all alternative solutions to fulfil these objectives, the Secretary of State is satisfied that no feasible alternative solutions are available that would meet the Project objectives with an appreciable reduction in predicted impacts on protected sites.

8 Stage 4: Imperative Reasons of Overriding Public Interest

The HRA derogation provisions provide that a project having an AEoI of 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.

The HRA derogations 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 also be of a social or economic nature, in accordance with Defra's guidance. The Applicant's derogation case [REP1-014, Section 16.1] concluded that the identified affected features of the Flamborough and Filey Coast SPA were not priority species and therefore the case presented for IROPI included consideration of social and economic benefits.

The parameters of IROPI are explored in relevant guidance, including the 2021 joint guidance[4] and the European Commission guidance (2018)[3], 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 imperative need in the public interest of the development must outweigh the harm, or risk of harm, to the integrity of the protected site which is predicted by the AA.

The Applicant's case for the imperative need for the Project as presented in [APP-063, Section 5] is based on the following points (in summary):

- There is an urgent need to establish a secure, diverse, affordable and resilient energy supply and meet decarbonisation targets. This provides a clear and urgent need for the development of SEP and DEP to help meet the UK Government target of 50GW of offshore wind installed capacity by 2030.
- Urgent action is required to reduce rising global temperatures and to limit the effects of climate change on human health and safety.
- The Climate Change Act 2008 (2050 Target Amendment) Order 2019 sets a UK target for at least a 100% reduction of greenhouse gas emissions (compared to 1990 levels) by 2050. This ambitious 'net zero' target will only be met by the crucial contribution from the offshore wind industry.

- NPS EN1 and EN3 require delivery of substantial amounts of renewable energy with offshore wind being one of the major components. The draft NPS EN1 states there is a 'critical national need'.
- Decarbonisation of the UK energy supply chain and increasing electricity demand results in a significant deficit in UK electricity supply compared with demand and therefore there is a clear public benefit inherent in the creation of new electricity supply capacity, such as will be provided by SEP and DEP.
- The UK Clean Growth Strategy (Business Energy and Industrial Strategy, 2017) recognises that actions and investments will be needed to meet the Paris Agreement commitments and that the shift to clean growth will be at the forefront of policy and economic decisions made by governments and businesses in the coming decades. This creates enormous potential economic opportunity – an estimated $13.5 trillion of public and private investment in the global energy sector alone will be required between 2015 and 2030, if the signatories to the Paris Agreement are to meet their national targets.

The Applicant argues that the Project can be viewed as of overriding interest compared with the extent of harm to the interests protected by the SPAs, because of the public interest from the benefits of the Project. These are the benefits in the reduction in carbon emissions served by renewable energy generation and the associated benefits to human health, public safety and the environment [APP-063, Paragraphs 211-213].

8.1 The National Policy Statements (NPSs)

8.1.1 Establishing the basis provided by the 2011 NPSs

The Project is considered against the 2011 NPSs, as those in force at the time of Examination and therefore subsequent references are to the 2011 NPSs. The Secretary of State notes that updated NPSs were designated in January 2024, and considers that these are important and relevant to her consideration of the Project. She has considered these and notes that the 2024 NPSs stress the urgent need for new electricity generating capacity and the importance of generation from renewable sources. She is satisfied that they do not materially alter her conclusions on IROPI for this Project.

The 2011 NPSs were established against obligations made as part of the Climate Change Act 2008. The overarching NPS for Energy (NPS EN-1) sets out national policy for energy infrastructure in Great Britain. It has effect, in-combination with the relevant technology-specific NPS, on recommendations made by the PINS to the Secretary of State on applications for energy developments that fall within the scope of the NPSs[28]. These provide the primary basis for decisions by the Secretary of State on National Energy Infrastructure.

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

[28] NPS EN-1 Para 1.1.1

- contributing to a secure, diverse and affordable energy supply[29].

The 2011 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 NPSs but confirmed that the current NPSs were not being suspended in the meantime. The NPS EN-1 published in 2024 confirmed that for any application accepted for examination before designation of the new NPSs the 2011 suite of NPSs should continue to have effect. The 2011 energy NPSs 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 2011 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. Section 104 of the Planning Act (2008)[30] 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[31] that the objective of ensuring the security of the electricity supply constitutes an IROPI.

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[32].

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[33]. They recognise that moving to a secure, low carbon energy system

[29] NPS EN-3 Para 1.3.1

[30] http://www.legislation.gov.uk/ukpga/2008/29/contents

[31] Judgement of 29. 7. 2019 – Case C-411/17 *Inter-Environnement Wallonie and Bond Beter Leefmilieu Vlaanderen.* ECLI:EU:2019;622.

[32] NPS EN-1 Para 2.2.8

[33] NPS EN-1 Para 11.7.2

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[34]. Under some 2050 pathways, electricity generation would need to be virtually emission-free, because emissions from other sectors were expected still to persist[35]. Consequentially, the need to electrify large parts of the industrial and domestic heat and transport sectors could double electricity demand by 2050[36].

The NPSs conclude that the UK needs sufficient electricity capacity from a diverse mix of technologies and fuels[37], 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[38]. 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[39,40]. The economic feasibility of harvesting sufficient available natural resource will be an important driver for proposed locations of renewable energy projects[41].

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[42].

8.2 The United Kingdom's legal commitment to decarbonise

This section sets out the obligations of the 2008 Act, against which the 2011 NPSs 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

[34] NPS EN-1 Para 2.2.1

[35] NPS EN-1 Para 2.2.6

[36] NPS EN-1 Para 2.2.22

[37] NPS EN-1 Para 2.2.20

[38] PS EN-1 Para 3.1.1

[39] NPS EN-1 Para 3.1.3

[40] NPS EN-1 Para 3.1.4

[41] NPS EN-3, Para 2.6.57

[42] NPS EN-3 Para 2.6.1

should be assessed, as well as updated ambitions in the British Energy Security Strategy (2022)[43].

8.2.1 Climate Change Act 2008

The Government, through the 2008 Act, set legally binding carbon targets for the UK, 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'.

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)[44], and UK Clean Growth Strategy[45]. 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.

8.2.2 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 GHG emissions to 'Net-Zero' by 2050, ending the UK's contribution to global warming within 30 years.' The CCC believe that this recommendation is 'necessary [against the context of international scientific studies], feasible [in that the technology to deliver the recommendation already exists] and cost-effective', reporting that 'falling costs for key technologies mean that . . . renewable power (e.g., solar, wind) is now as cheap as or cheaper than fossil fuels.' Importantly, the CCC recommendation identifies a need for low-carbon infrastructure development which is consistent with the need case set out in NPS EN-1, but points to an increased urgency for action.

[43] https://www.gov.uk/government/publications/british-energy-security-strategy

[44] HM Government. The UK Low Carbon Transition Plan. HMSO, 2009. Five Point Plan.

[45] https://www.gov.uk/government/publications/clean-growth-strategy

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[46]. 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. The Net Zero Strategy was set 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)[47]. 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[48], Government committed to increase their ambition on offshore wind to 50 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.

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 government policy will certainly be met by those projects currently under consideration. 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 UK Government 2030 ambitions will fall short. In conclusion, offshore wind is recognised as being an important technology for low-carbon generation and the urgent need for large capacities of low-carbon generation is clear to avoid compromising security of electricity supply. Specifically, the Project will be a necessary part of the future generation mix, and as such will make a valuable contribution to meeting the UK Government's achievement of decarbonisation commitments as part of the legally binding target for Net Zero by 2050.

[46] https://www.gov.uk/government/publications/net-zero-strategy

[47] BEIS (2019). Offshore wind Sector Deal. BEIS Policy Paper, 2019.

[48] HM Government, The Queen's Speech 2019 – background briefing notes. https://www.gov.uk/government/publications/queens-speech-december-2019-background-briefing-notes

8.3 Conclusion

The ExA [ER 26.10.36] notes that the absence of priority habitats and species allows the consideration of benefits of a social and economic nature. The ExA also notes that the extent of the harm to the relevant site features from the Project alone is relatively small; the AEoI arise from in-combination effects. The ExA is content that the benefits of the Project, particularly from its contribution to the reduction in UK carbon emissions and maintaining energy security, are sufficient to allow the Secretary of State to conclude that the Project is of imperative overriding public interest.

The Secretary of State agrees with the ExA and the Applicant and considers that imperative reasons in the public interest for the Project to proceed are clearly established, especially the contribution that the Project would make towards renewable electricity generation and ensuring the security of electricity supply from a domestically generated source. The Secretary of State also considers that such need in the public interest for the Project clearly outweighs the predicted harm to the integrity of the protected sites, both when considering the mortality levels of bird species predicted by modelling preferred by the Secretary of State and the range of predicted mortality impacts presented by the Applicant and NE [ER 26.10.15].

9 Proposed compensatory measures

Having determined that there are no feasible alternative solutions and that the Project must be carried out for IROPI, the Secretary of State has proceeded to consider below the requirements of Regulation 68, which are to provide that any necessary compensatory measures are secured to ensure that the overall coherence of the NSN is maintained.

At the beginning of the Examination, the Applicant submitted a package of compensatory measures for the sandwich tern feature of the NNC and GW SPAs [APP-069, APP-070, APP-071] and for the kittiwake feature of FFC SPA [APP-072, APP-073]. These measures were secured through Schedule 17 of the dDCO. While the Applicant maintained throughout the Examination that AEoI on the guillemot feature of FFC SPA could be excluded, it provided a without-prejudice set of compensatory measures. The Applicant provided draft wording for inclusion in Schedule 17 of the dDCO [REP8-008] to secure these measures.

The Applicant has committed to delivering the full compensatory packages for each species regardless of whether the Project is constructed concurrently or sequentially. The full suite of measures would be delivered at the same time, even where this leads to compensation for one project being delivered earlier than would be the case for a standalone project. However, if SEP or DEP are delivered in-isolation, where practical, the Applicant states that the scale of compensation would be reduced in proportion to the impacts of the individual project [APP-072, REP7-018, REP7-020].

Other than the supporting measures for sandwich tern at Blakeney Point within the NNC SPA (see Section 9.3), the proposed compensatory measures are to be implemented remotely to the impacted protected sites. The Secretary of State agrees with NE [REP8-103] that the accrual of any material benefit to the NSN (unless the Loch Ryan site is ultimately incorporated into the NSN) will be indirect, and quantifying such benefits is unlikely to be possible. NE advised that it is not opposed to the implementation of seabird compensation at a species bio-geographic population scale, but the likely level of benefit to the NSN should be carefully considered in conjunction with uncertainty around method effectiveness and Project impacts when appraising the proposed scale of the compensatory measures. The Secretary of State agrees with NE that whilst like-for-like (i.e. same species, same protected site population) compensation is most favourable in accordance with the 'compensation hierarchy', compensation for the same species at a remote location at a bio-geographic population scale is acceptable where the Applicant demonstrates that like-for-like is not possible or feasible. The Secretary of State has taken account of the remoteness of the measures when considering the scale of compensation required to compensate for the predicted mortality, although agreeing with NE [REP8-103] that quantifying benefits is likely to be challenging.

9.1 Strategic compensation

9.1.1 The Applicant's case

The Applicant, IPs and NE have common ground in that an effective compensatory measure for sandwich terns, kittiwakes and auk species is through increases in prey availability. Specifically,

it is the Applicant's view [REP8-040] that the most effective compensation measure for impacts of offshore wind developments on sandwich tern, kittiwake, gannet, guillemot and razorbill in UK North Sea waters would be to reduce fishing pressure on sandeel stocks in order to maintain sandeel total stock biomass above the "one third for the birds" threshold (Cury et al. 2011[49], Hill et al. 2020[50]). The Applicant considers that there is strong evidence that allowing sandeel stocks to recover from their current depleted state would greatly increase seabird populations within a few years, and for sandeel dependent seabirds such as sandwich tern would give much greater gain than the precautionary estimates of the cumulative impact of the offshore wind industry. The Applicant references Ecopath/Ecosim modelling by NE which predicts a 42% increase in seabird numbers in the North Sea within 15 years of closure of the North Sea sandeel fishery (Bayes and Kharadi 2022[51], Natural England 2023[52]).

The Applicant presents its review of the evidence concerning potential effect of closure of sandeel fisheries in the North Sea in 'Annex 1 A – Initial review of compensatory measures for sandwich tern and kittiwake' [APP-065 section 4.5.1]. For kittiwake, sandeel abundance strongly influences breeding success (Furness and Tasker 2000[53], Frederiksen et al. 2004[54], Cury et al. 2011[49]), and breeding success strongly influences whether kittiwake colonies increase or decrease in breeding numbers (Monnat et al. 1990[55], Cadiou et al. 1994[56], Coulson 2011[57], 2017[58]).

[49] Cury, P.M., Boyd, I.L., Bonhommeau, S., Anker-Nilssen, T., Crawford, R.J.M., Furness, R.W., Mills, J.A., Murphy, E.J., Österblom, H., Paleczny, M., Piatt, J.F., Roux, J-P., Shannon, L. and Sydeman, W.J. 2011. Global seabird response to forage fish depletion – one-third for the birds. Science 334: 1703-1706.

[50] Hill, S.L., Hinke, J., Bertrand, S., Fritz, L., Furness, R.W., Ianelli, J.N., Murphy, M., Oliveros-Ramos, R., Pichegru, L., Sharp, R., Stillman, R.A., Wright, P.J. and Ratcliffe, N. (2020). Reference points for predators will progress ecosystem-based management of fisheries. Fish and Fisheries 21: 368-378.

[51] Bayes, J. and Kharadi, N. (2022). Marine natural capital accounting: impacts of the sandeel fishery in the North Sea. UKNEE Webinar July 2022. UKNEE.

[52] Natural England (2023). Impacts of the sandeel fishery in the North Sea. Unpublished report to Defra. (cited in SSE Renewables 2022. Berwick Bank Wind Farm Derogation Case Fisheries Compensatory Measures Evidence Report).

[53] Furness, R.W. and Tasker, M.L. (2000). Seabird-fishery interactions: quantifying the sensitivity of seabirds to reductions in sandeel abundance, and identification of key areas for sensitive seabirds in the North Sea. Marine Ecology Progress Series 202: 253–264.

[54] Frederiksen, M., Wanless, S., Harris, M.P., Rothery, P. and Wilson, L.J. (2004). The role of industrial fisheries and oceanographic change in the decline of North Sea blacklegged kittiwakes. Journal of Applied Ecology 41: 1129-1139.

[55] Monnat, J.Y., Danchin, E. and Estrella, R.R. (1990). Assessment of environmental quality within the framework of prospecting and recruitment – the squatterism in the kittiwake. Comptes Rendus de l'Academie des Sciences Serie III Life Sciences 311: 391-396.

[56] Cadiou, B., Monnat, J.Y. and Danchin, E. (1994). Prospecting in the kittiwake, Rissa tridactyla – different behavioural patterns and the role of squatting in recruitment. Animal Behaviour 47: 847-856.

[57] Coulson, J.C. (2011). The Kittiwake. T & AD Poyser, London.

[58] Coulson, J.C. (2017). Productivity of the black-legged kittiwake Rissa tridactyla required to maintain numbers. Bird Study 64: 84-89.

Sandeels (specifically *Ammodytes marinus*) are the target of what has been the largest single-species fishery in the North Sea over recent decades. Kittiwakes at FFC SPA forage over a large area from that colony, and their foraging area includes some of the most important sandbanks supporting high densities of sandeels and the sandeel fishery (Carroll et al. 2017[59]). There is strong evidence that the sandeel fishery has caused depletion of sandeel biomass in this region (Lindegren et al. 2018[60]), and that reduced abundance of sandeels as a result of the high fishing effort on sandeels has led to reduced breeding success of kittiwakes at FFC SPA (Carroll et al. 2017[59]). Sandeel is a short-lived fish which starts to breed when only 1 or 2 years old, with high reproductive potential, and since kittiwakes will feed on all age classes of sandeels but especially on 1- and 2-year-old sandeels, the Applicant contends that an increase in sandeel abundance would be likely to influence kittiwake breeding success with a time lag of only 1 or 2 years. The Applicant references a study by Frederiksen et al. (2004)[54] which showed that breeding success of kittiwakes at the Isle of May (part of Forth Islands SPA) was on average 0.5 chicks per pair lower during years when sandeel fishing occurred in the area than it was in years with no sandeel fishing. A decision was taken to close an area to sandeel fishing (the 'sandeel box' off the east of Scotland) because of persistent low breeding success of kittiwake indicative of the poor condition of the sandeel stock in the area. The consequence of that closure was monitored. Closure of the fishery resulted in an increase in sandeel stock biomass (Greenstreet et al. 2006[61]) and an increase in kittiwake breeding success at colonies within the closed area compared to those outside (Daunt et al. 2008[62], Frederiksen et al. 2008[63]), providing experimental evidence for the mitigation of fishery impact by closing the fishery.

Lindegren et al. (2018)[60] carried out a hindcast analysis of the Dogger Bank sandeel stock to assess the consequence of the high fishing mortality. They estimated that sandeel spawning stock biomass would have been about twice as large now as it is, if the fishery had maintained fishing mortality (F) at F=0.4 rather than at the levels of F=0.8 to 1.2 as seen during 1999-2009 in the history of this fishery. Indeed, the stock would be even larger now if there had been no fishery harvesting sandeels, although Lindegren et al. (2018) did not report on that scenario. However, their results further support the conclusion that the high fishing mortality imposed on the sandeel stock has been a major influence on the abundance of the sandeel, and hence on the breeding success of kittiwakes. Lindegren et al. (2018) also identified influences of sea temperature and copepod abundance on the abundance of sandeels and suggested that long term trends in those drivers may inhibit recovery of sandeels if fishing pressure was reduced. In

[59] Carroll, M.J., Bolton, M., Owen, E., Anderson, G.Q.A., Mackley, E.K., Dunn, E.K. and Furness, R.W. (2017). Kittiwake breeding success in the southern North Sea correlates with prior sandeel fishing mortality. Aquatic Conservation: Marine and Freshwater Ecosystems 27: 1164-1175.

[60] Lindegren, M., van Deurs, M., MacKenzie, B.R., Clausen, L.W., Christensen, A. and Rindorf, A. (2018). Productivity and recovery of forage fish under climate change and fishing: North Sea sandeel as a case study. Fisheries Oceanography 27: 212-221.

[61] Greenstreet, S., Fraser, H., Armstrong, E. and Gibb, I. (2010). Monitoring the consequences of the northwestern North Sea sandeel fishery closure. Scottish Marine and Freshwater Science 1: 1–31.

[62] Daunt, F., Wanless, S., Greenstreet, S. P. R., Jensen, H., Hamer, K. C., and Harris, M. P. (2008). The impact of the sandeel fishery closure on seabird food consumption, distribution, and productivity in the northwestern North Sea. Canadian Journal of Fisheries and Aquatic Sciences 65: 362-381.

[63] Frederiksen, M., Jensen, H., Duant, F., Mavor, R.A. and Wanless, S. (2008). Differential effects of a local industrial sand lance fishery on seabird breeding performance. Ecological Applications 18: 701–710.

addition, severe reduction in forage fish stock biomass can lead to increased natural mortality that may inhibit recovery, and there is evidence of this with sandeel declines to low biomass (Saraux et al. 2020[64]). At present, the Dogger Bank sandeel stock remains considerably below its long-term average abundance and is subject to a fishing mortality around F=0.6 (ICES 2020), a figure above the level tested in the scenario of Lindegren et al. (2018), and a figure which their scenario modelling clearly demonstrates has a negative impact on sandeel abundance. At present the spawning stock biomass in this area is less than 10% of its highest historical level and is slightly below the limiting spawning stock biomass at which ICES should recommend closure of the fishery (Blim of 110,000 tonnes SSB) because there is an increased risk of recruitment failure in this stock (ICES 2020[65]).

The Applicant contends [APP-065] that the evidence suggests that the continuation of sandeel fishery is likely to continue to cause mortality of many thousands of kittiwake chicks per year compared to a scenario with no fishing of the sandeel stock. It also identifies that the single most effective practical management action to assist the kittiwake population would be closure of the sandeel fishery (Carroll et al. 2017, Lindegren et al. 2018, Wright et al. 2018[66]). Mortality of chicks has less impact on the kittiwake population than the same mortality of adults. On the basis of the demographic parameters of kittiwakes in the North Sea (adult survival 0.854, juvenile survival 0.79, age of first breeding 4 years; Horswill and Robinson 2015[67]), two fledglings would be required, on average, to give rise to one adult surviving to recruit into a local colony at 4 years of age (i.e. 0.79 x 3 = 0.49). If sandeel fishing reduced productivity at FFC SPA by an average of 0.5 chicks per pair per year which the Applicant considers to be approximately the scale of the impact indicated by the data for this region and equals the estimate for the kittiwakes at the Isle of May, that would be equivalent to 50,000 pairs x 0.5 chicks per pair, or 25,000 chicks that die due to scarcity of sandeels. If those chicks had survived to fledge, they would result in about 12,000 adults per year surviving to recruit into colonies at 4 years of age. That is three to four times more than mortality estimated to be caused by collision mortality at offshore wind farms in UK North Sea, so represents a potential for far greater compensation than the precautionary estimate of losses incurred due to all installed, consented, and submitted proposals for UK OWFs.

Such a measure could not be developer-led and requires a strategic approach led by the UK Government to provide compensation on behalf of the offshore windfarm industry. This was agreed with NE [REP1-139]. Should such a strategic approach become available during the pre-construction and construction phase of the Project, the Applicant has included an option in Schedule 17 to contribute to a Strategic Compensation Fund, such as the Marine Recovery Fund

[64] Saraux, C., Sydeman, W., Piatt, J., Anker-Nilssen, T., Hentati-Sundberg, J., Bertrand, S., Cury, P., Furness, R.W., Mills, J.A., Österblom, H., Passuni, G., Roux, J-P., Shannon, L.J. and Crawford, R.J.M. (2020). Seabird-induced natural mortality of forage fish varies with fish abundance: evidence from five ecosystems. Fish and Fisheries doi 10.1111/faf.12517.

[65] ICES (2020). Herring Assessment Working Group (HAWG) Report 2020 Section 10. Sprat in Division 3.a and Subarea 4 (Skagerrak, Kattegat and North Sea). ICES, Copenhagen.

[66] Wright, P., Regnier, T., Eerkes-Medrano, D. and Gibb, F. (2018). Climate change and marine conservation: Sandeels and their availability as seabird prey. MCCIP, Lowestoft.

[67] Horswill, C. and Robinson, R.A. (2015). Review of seabird demographic rates and density dependence. JNCC Report No. 552. JNCC, Peterborough.

(MRF) as a strategic alternative to project-led measures. This would be implemented wholly or partly in substitution for the project-led compensation measures or as part of an adaptive management approach. On 30 December 2022, the Department for Energy Security and Net Zero (formerly BEIS) published a factsheet on the Energy Security Bill and, more specifically, the offshore wind environmental improvement package in which it stated the Government's intention was to have the MRF operational from late 2023. If the MRF became available in the anticipated timescale of late 2023, then it was considered possible that the Applicant would be able to utilise the fund within the existing timetable for delivery of SEP and DEP [REP1-036, Q1.14.1.20].

The Applicant is continuing to liaise with Defra and NE regarding strategic compensation and particularly prey enhancement measures. In response to a suggestion made by NE in its Relevant Representation [RR-063], the Applicant agreed to attend a meeting with NE, MMO and the Centre for Environment, Fisheries and Aquaculture Science to discuss potential evidence gathering with respect to sandwich tern prey species. However, the Applicant is not aware of any further information that has become available since application in respect of the Government-led Strategic Ecological Compensation Study looking at prey availability measures for seabirds [REP8-040].

For the avoidance of doubt, the Applicant considers that its proposed Project-led measures are capable of fully compensating for the predicted impacts from the Project and is committed to delivering all. However, it considers that the MRF provides an additional level of robustness and confidence that the necessary compensation would be delivered as this option could be utilised in place of Project-led measures or as an adaptive management measure should Project-led measures fail to deliver the necessary level of compensation.

9.1.2 Position of IPs

NE [REP8-103] agrees with the Applicant that compensation is best delivered at a strategic level as set out in its *'Approach to Offshore Wind'*[68]and suggests that its outstanding concerns with the Applicants Project-level compensation package demonstrates this. NE consider that fisheries management is also more likely to be feasible and effective as a strategic measure than bycatch reduction and predator eradication measures. The Applicant [REP7-020] references advice of NE[69] to the HP4 Examination, with NE stating "*Natural England have long held the view that a primary pressure acting on English seabirds, and especially kittiwake, is the reduction in prey availability associated with commercial fisheries targeting forage fish (notably sandeels). A number of reviews have concluded that improving prey availability is likely to be the most effective way of compensating for offshore wind impacts on seabirds. However, forage fish management is highly complex, and an ecosystem-based approach is needed to safeguard sufficient prey resources for seabirds, whilst reducing the risk of unintended consequences (e.g. pressure on other fisheries). Nevertheless, improving the amount of prey remains the single strategic measure most likely to deliver significant benefits to FFC SPA seabird populations. We*

[68] Natural England. 2021. Natural England's Approach to Offshore Wind. Natural England Technical Information Note, TIN181.

[69] Natural England, 2022. Natural England's End of Examination Position on the Applicant's Proposed Compensatory Measures for Hornsea Project Four Offshore Wind Farm. 16 pp.

highlight that prey availability measures would also have the additional benefit of addressing the effective habitat loss that could result from auk displacement, by increasing the foraging resource within those areas that remain available.".

Nevertheless, NE [REP1-139, Q1.14.1.21] [REP8-103] advises caution because inputting into the MRF is not yet agreed and, due to current uncertainties with mechanisms associated the MRF, that project level compensation is still progressed in parallel to having options available through DCO conditions to progress strategic compensation measures if required and / or when available.

Similarly, the MMO [REP1-116] highlights concern around the reliance on a fund and mechanism that does not exist. There is no certainty in the implementation of the fund, or that the Applicants will be able to rely on it fully for compensatory measures required by the Project. There is no guarantee as yet that contribution to the fund would be specifically directed towards the compensation of kittiwakes or sandwich terns. Until the fund is formally introduced by the Government and the distribution criteria of those funds is formally agreed by all parties concerned, then the MMO would recommend the Applicants proactively implement their own proposed package of compensatory measures.

The RSPB [REP1-161] also did not agree with the Applicant that the yet to be legislated and implemented MRF could be relied upon.

9.1.3 The ExA and Secretary of State's conclusion

The ExA recommended [ER 26.10.49 et seq.] that Schedule 17 of the DCO is suitably drafted to secure commitments to adopting strategic compensation measures and the further work required to agree the detail of measures both for both compensation and adaptive management. The ExA recommends that, while Schedule 17 of the DCO secures the commitment to deliver strategic compensation, the detail of the strategic compensation measures themselves, in terms of locations, design, any necessary consents, timescales, and mechanism of implementation, are as yet unknown. As such, the ExA cannot rely on Schedule 17 alone to conclude that the predicted AEoI of the FFC SPA and the NNC SPA can be effectively compensated. However, if the Secretary of State is able to secure and be satisfied that this work could be in place at an appropriate juncture to compensate for the predicted AEoI of the FFC SPA and the NNC SPA, then the Secretary of State may be able to conclude that the, in principle, strategic compensation as proposed could ensure the overall coherence of the UK NSN.

The Secretary of State agrees with the Applicant and NE that increases in prey availability would likely be a highly effective compensatory measure for sandwich terns, kittiwakes and auk species of the GW SPA, NNC SPA and FFC SPA, and she considers that the Applicant makes a strong case and reasonable attempt at quantifying the potential benefits of doing so for these species. The Secretary of State recognises the need for strategic compensation and it has in-principle support of the SNCBs and Non-Governmental Organisations.

The Energy Act received Royal Assent in 2023 but neither the MRF nor any other appropriate vehicle for strategic compensation is yet in place. The Secretary of State agrees with the ExA, NE, MMO and RSPB that she cannot yet solely rely on strategic compensation to effectively compensate for the impacts of the Project. For example, it is not clear whether fisheries management measures as described by the Applicant will be a compensatory measure which is

included in any future strategic compensation scheme. Project-led compensatory measures are therefore required to be progressed at this stage.

However, she agrees with NE [REP1-139] that it is reasonable for the DCO to include provisions for the Applicant to utilise a strategic approach in place of Project-led measures should this become available at an appropriate juncture post-consent for this Project. Parts 1 (sandwich tern), 2 (kittiwake) and 3 (guillemot) of Schedule 17 contain similarly worded, novel provisions allowing for strategic compensation measures to be adopted in place of Project-led measures. The Secretary of State has made minor amendments to the provisions. The Secretary of State notes that the ExA report that Schedule 17 secures a 'commitment to deliver strategic compensation', but this is incorrect. Schedule 17 secures the *option* for strategic compensation to be utilised if agreed by the Secretary of State in the future. For sandwich tern for example, paragraph 4 secures that the CIMP must include:

> *"(i) provision for the option to be exercised by the undertaker, following consent in writing of the Secretary of State, to pay a contribution to the Strategic Compensation Fund wholly or partly in substitution for the predator management measure at the NNC or as an adaptive management measure for the purposes of paragraphs 4(3)(f) and (3)(g) of this Part of this Schedule. The sum of the contribution to be agreed between the undertaker and Defra or other Government body responsible for the operation of the Strategic Compensation Fund in consultation with the STCSG;*
>
> *(j) provision for the option to be exercised by the undertaker, following consent in writing of the Secretary of State, to pay a financial contribution towards the establishment of compensation measures by another party wholly or partly in substitution for the predator management measure at the NNC or as an adaptive management measure for the purposes of paragraphs 4(3)(f) and (3)(g) of this Part of this Schedule. The sum of the contribution to be agreed between the undertaker and the party delivering the measures, in consultation with the STCSG. The Secretary of State shall consult with the relevant statutory nature conservation body prior to granting consent in terms of this paragraph; and*
>
> *(k) provision for the option to be exercised by the undertaker, following consent in writing of the Secretary of State, to collaborate with another party in the delivery of compensation measures wholly or partly in substitution for the predator management measure at the NNC or as an adaptive management measure for the purposes of paragraphs 4(3)(f) and (3)(g) of this Part of this Schedule. The Secretary of State shall consult with the relevant statutory nature conservation body prior to granting consent in terms of this paragraph."*

Paragraph 5 then secures that:

> *"The undertaker shall not be required to undertake the nesting habitat improvements and the restoration of lost breeding range measures, the measures to improve breeding success at SPA sites other than the NNC, or the predator management measures to the extent that—*
>
> *(a) following consent of the Secretary of State, a contribution to the Strategic Compensation Fund has been elected wholly in substitution for the nesting habitat improvements and restoration of lost breeding range measures for the purposes of paragraph 4(2)(i) of this Part of this Schedule, or in substitution for the measures to*

improve breeding success at SPA sites other than the NNC for the purposes of paragraph 4(2)(i) of this Part of this Schedule, or in substitution for the predator management measures for the purposes of paragraph 4(3)(i) of this Part of this Schedule;

(b) following consent of the Secretary of State, a financial contribution towards the establishment of compensation measures by another party has been elected wholly in substitution for the nesting habitat improvements and restoration of lost breeding range for the purposes of paragraph 4(2)(j) of this Part of this Schedule, or in substitution for the measures to improve breeding success at SPA sites other than the NNC for the purposes of paragraph 4(2)(j) of this Part of this Schedule, or in substitution for the predator management measures for the purposes of paragraph 4(3)(j) of this Part of this Schedule; or

(c) following consent of the Secretary of State, the undertaker has elected to collaborate with another party in the delivery of compensation measures wholly in substitution for the nesting habitat improvements and restoration of lost breeding range measures for the purposes of paragraph 4(2)(k) of this Part of this Schedule, or in substitution for the measures to improve breeding success at SPA sites other than the NNC for the purposes of paragraph 4(2)(k) of this Part of this Schedule, or in substitution for the predator management measures for the purposes of paragraph 4(2)(k) of this Part of this Schedule."

As secured, a decision to agree to any potential future request of the Applicant to utilise strategic compensation would be made by the Secretary of State in consultation with the SNCB at that time. Before agreeing to any potential future request to utilise strategic compensation including the MRF, the Secretary of State would expect to have greater clarity and certainty regarding the mechanism for delivery of the compensation measures and, for example but not limited to: the ecological relevance of any measures to the impacted species and protected sites; the relevant monetary contribution required from the Project and how that would be utilised in delivering compensation for the target species; clear agreement from Defra (or other body that may be responsible for administering any strategic compensation programme at that time) that the species predicted to be impacted and at the estimated quantum of mortality due to the Project are appropriate to be compensated via any such strategic mechanism; and how the success of the strategic compensation is to be monitored and maintained for the lifetime of the Project. The Secretary of State would expect NE as the SNCB to be in agreement with Defra regarding the ecological appropriateness of strategic compensation measures. It remains unclear to the Secretary of State whether this will be available at an appropriate juncture for this Project to utilise, in line with the indicative construction and operational timeline.

The Secretary of State notes the announcement by Defra on 31 January 2024[70] to, amongst other measures, permanently close sandeel fisheries in English Waters of the North Sea from April 2024. The announcement acknowledges sandeels as a vital food source for vulnerable seabirds (and marine mammals and commercially important fish species). The closure is said to bolster the resilience of these species and make space for nature recovery. The announcement does not mention the relevance of sandeel fisheries closures for the MRF or strategic

[70] https://www.gov.uk/government/news/nature-recovery-to-be-accelerated-as-the-government-delivers-on-measures-to-protect-land-and-sea

compensation for impacts of OWFs. During Examination the Applicant acknowledged [REP8-040] that Defra's proposals were at public consultation stage and closed on 30 May 2023. The Applicant states that although the consultation documentation did not directly consider the delivery of management measures in the context of strategic compensation for offshore wind, it is of relevance given the potential implications of any new spatial management measures on available environmental headroom and the overall resilience of prey populations for key seabird species such as sandwich tern and kittiwake. As such, the Applicant was contributing to the preparation of a joint consultation response from the Offshore Wind Industry Council.

The Secretary of State agrees with the Applicant that the announcement is relevant given potential implications of such measures on available environmental headroom for impacts on seabirds and the overall resilience of prey populations for these species, which may result in positive outcomes for seabird populations of SPAs in the North Sea and a greater resilience of these to impacts on such species by OWFs. Whilst this may have longer-term implications for protected site Conservation Objectives and AAs, the relevant implication of this announcement for strategic compensation which could be utilised within the timeframes of this Project is unknown.

9.2 Kittiwake

As presented in the 'Apportioning and HRA Updates Technical Note' (revision E) [REP8-038] which took account of initial concerns of NE and subsequent Gateshead Kittiwake Tower Modification Quantification of Productivity Benefits (Revision B)' technical note [REP3-088], the Applicant identifies a compensation requirement of 17 adult kittiwake per annum against the 95% upper confidence limit prediction of the collision risk modelling. NE [REP8-032] agrees with the estimates of collision risk. The Secretary of State agrees and welcomes the Applicants commitment to compensate for the upper 95% CI.

To provide this level of compensation, the Applicant's in-principle compensatory measures plan submitted during the Examination proposed the construction of onshore artificial nest sites (ANSs). Information to support the feasibility and appropriateness of ANS creation was provided in RIAA Appendix 3: Kittiwake Compensation Document [APP-072] (the kittiwake CMD) and RIAA Appendix 3A: Outline Kittiwake CIMP (Compensation Implementation and Monitoring Plan) [APP-073].

An initial review of feasible options for compensating for the loss of kittiwake [APP-065] considered further intervention and addition to structures within the Lowestoft area in the County of Suffolk. East Suffolk Council (ESC) [RR-030, REP1-074, REP1-076] raised concern regarding this since kittiwakes are already being nested in artificial structures around Lowestoft as a compensatory measure adopted by other projects. In this respect, ESC expressed resistance to any further proposals until a strategic level approach was adopted, particularly as kittiwakes within Lowestoft were coming into conflict with human activity.

Whilst the Applicant maintained that there is strong ecological merit for further measures in Lowestoft, it noted ESCs concerns and consequently shifted focus to an ANS already constructed at Saltmeadows, Gateshead in the County of Tyne and Wear owned by the LPA, Gateshead Council. NE supports [REP8-032] the Applicant in focussing on this ANS at

Saltmeadows. Proposals developed whereby the Applicant would provide additional north-facing walls to the ANS to encourage and support successful breeding at that location. The Applicant maintained that the modifications to the existing kittiwake tower represented additionality and enhancement to the effectiveness of the ANS. The Applicant proposed to replace poor-performing south facing nests with north facing nests that kittiwake prefer [APP-072].

The Applicant [APP-072, APP-073] stated that detailed design of the improvements to the Saltmarsh ANS can be further developed and agreed post-consent through the Kittiwake CIMP and with the involvement of the kittiwake compensation steering group (KCSG). This will enable the detailed plans to account for the specifics of the selected site location, the status of any other similar plans or proposals for kittiwake compensation in that location and other relevant points of detail including the final scale of compensation to be provided. Examples of key considerations at the detailed design stage include:

- confirmation (where relevant) of the location, size and scale of modifications;
- dimensions;
- materials;
- installation requirements;
- maintenance, security and monitoring requirements to be built into the design; and
- incorporation (where relevant) of any 'added value' measures into the design, such as public information boards.

The numbers of kittiwake nests and breeding success achieved at these nests will be monitored. This will be carried out annually following standard monitoring procedure "Productivity-monitoring method 2" as recommended by Walsh et al. (1995)[71]). This involves a count of Apparently Occupied Nests (AONs) in late May or early June (when almost all pairs that are going to breed will have complete nests and most will be incubating eggs) and a count during the second week in July which allows numbers of chicks to be counted in each nest. The standard methodology recommended by Walsh et al. (1995) is followed throughout Britain and Ireland in monitoring kittiwake numbers and breeding success (JNCC 2022)[72].

Monitoring of numbers and breeding success will be continued at least until the success of the compensation has been demonstrated but potentially throughout the operational life-span of SEP and DEP. Monitoring will also include counts of breeding numbers at other sites in Gateshead and breeding success achieved at those sites in order to permit comparison between the improved structures and performance elsewhere within the population. This will allow the gain achieved by compensation to be assessed with a high degree of precision and accuracy. That in turn would inform any need for adaptive management (which could involve further improvements to nest sites on other buildings/structures, or further updates to the modifications if for example other unforeseen issues arose).

The Tyne kittiwake colonies are already monitored annually by the local monitoring group (Northumbria Ringing Group), therefore there may be no need for any additional monitoring while that programme continues. In all cases monitoring results will be shared with the KCSG on an

[71] Walsh, P.M., Halley, D.J., Harris, M.P., del Nevo, A., Sim, I.M.W. and Tasker, M.L. 1995. Seabird Monitoring Handbook for Britain and Ireland. JNCC, RSPB, ITE and The Seabird Group, Peterborough.

[72] JNCC, 2022. Seabird Monitoring Programme Online Database (Online Database).

annual basis and any requirement for adaptive management measures will be agreed with the group. There will also be a need for ongoing monitoring and maintenance of the new ledges. These are likely to require replacing; the lifespan of marine ply with kittiwake nests on it is uncertain but may need to be replaced after about ten years of use. Ongoing monitoring of their condition would therefore be undertaken. At Gateshead that might best be done through existing arrangements through Gateshead Council. Kittiwake nests sometimes wash away during autumn/winter, but some remain from one season to the next if in sheltered locations.

While NE agreed that artificial nests could in principle contribute to the coherence of the NSN if the measures delivered a net increase in the overall population [RR-063], it remained concerned about confining the measures solely to the provision of artificial nesting sites [REP1-139].

In response to comments of NE, the Applicant produced a technical note 'Gateshead Kittiwake Tower Modification Quantification of Productivity Benefits (Revision B)' [REP3-088]. As presented in the Apportioning and HRA Updates Technical Note (revision E) [REP8-038], the Project is required to compensate for 17 adult kittiwakes per year based on the most recent upper 95% confidence interval (CI) estimates of collision risk. Based on the demographic parameters of kittiwake in the North Sea, two fledglings are required on average to produce one adult surviving to recruit into a local colony. To compensate for the loss of 17 adults per year, increased production of a least 34 (biogeographic population) and 68 (NSN) chicks fledged per year are required [REP3-088]. The Applicant predicts that the provision of new north faces to the kittiwake tower would increase output to 70 adults per year, or 35 per year into the FFC SPA colony population [REP3-088, Paragraphs 28-32]. In the event of colonisation of the tower nests taking longer than expected, a mortality debt could accrue. If this occurred, the two new faces of the tower could be maintained beyond the operational period of the Project and for a sufficient number of years to balance the accrued collision mortality debt. A slow rate of colonisation would have a similar effect and would be addressed in the same way. Following the Applicant's submission of [REP3-088], NE advised [REP5-092] that the Applicant had largely satisfied its requests for additional information on kittiwake breeding performance on the Tyne and its implications for the proposed compensation. NE [REP8-032] agrees that the calculations supporting the scaling of the measure in [REP3-088] [REP8-038] are appropriate.

Indicative designs for the kittiwake tower modifications were provided to the Examination at D6 [REP6-010]. NE reported [REP7-112] that the kittiwake tower designs addressed its initial concerns regarding having kittiwakes facing each other, although noted there was no information regarding how high off the ground the new wall faces would be (noting shelves would only be attractive to kittiwakes if there was reasonable clearance away from vegetation that could conceal predators) and that the indicative designs retained south-facing shelves. In response, the Applicant [REP8-067] confirmed that an 8-metre clearance would be achieved between the base of the tower and the lowest point of the proposed new nest face and that the south-facing shelves were included as an additional habitat benefit.

The works, whether the installation of nesting ledges on buildings or the adjustment of existing structures, would be undertaken outside of the kittiwake full breeding season (March to August inclusive at Lowestoft and Gateshead) to avoid disturbance to existing nesting activity and to allow birds to choose a suitable nesting site from those newly installed or adjusted, from the start of the breeding season [APP-072]. The Applicant intends to implement the measures as soon as possible, but at least three breeding seasons prior to commencement of operation. Subject to obtaining the necessary permissions, it is considered highly likely that measures could be

implemented sooner than this noting the relative simplicity of the measures in design and implementation.

At the close of the Examination, NE [REP8-032, REP8-103] was content in principle with the compensatory measures for FFC SPA kittiwakes, considering them to be ecologically and technically viable. NE did however remain concerned that insufficient information had been provided to the Examination, notably:

- lack of a detailed concept design;
- the proposed lead in time of 3 breeding seasons prior to the first turbines becoming operational, compared to the 4 breeding seasons secured in the DCOs for other OWF projects; and
- although the measure will be in place prior to operation, a decreased lead in time increases the likelihood that the measure will not be delivering compensation at the scale required before impacts occur.

The RSPB held concerns about the level of detail in the Applicant's proposal, querying the adequacy of the evidence on the effectiveness of the measures, the lead-in time for delivery and the length of time the compensation would be in place [RR-083, REP1-161].

The Applicant considers that three breeding seasons as opposed to four would be sufficient, citing the Hornsea Three Offshore Wind Farm (Amendment) Order 2023 (Hornsea 3) [REP8-062, Paragraph 212]. On this basis, the Applicant submits [REP8-062, Paragraph 216] that all matters to secure the compensatory measures are in progress in accordance with a suitable timescale and thus the Secretary of State can be confident that there is a clear plan for the practical delivery of the compensation measures.

9.2.1 ExA and the Secretary of State's conclusion

The ExA [ER 26.10.92 et seq.] recognise the compensatory measure has a high degree of ecological merit and the in-principle support of Gateshead Council as landowner and LPA The ExA recommend that the legal mechanism set out within the DCO Schedule 17 Part 2 provides an appropriate mechanism for the onward development and implementation of the measure. The ExA acknowledge the Applicant's detailed position on the timescales to achieve the compensation set in the kittiwake compensation document [APP-072, Section 6.4.6], and that three breeding seasons is advocated as opposed to four [APP-072, Paragraphs 132-134, Table 6-4]. The assertion that any accrued mortality debt arising from not bringing compensatory measures into effect four seasons in advance could be dealt with in the second year of operation has merit. While the exact circumstances of Hornsea 3 were not explained in the Examination, it did appear to the ExA there is some precedent for a reduced lead-in time for the compensatory measure to be active prior to first operation of a wind turbine. The fact that the actual level of mortality arising from the Project is relatively small also adds weight to the Applicant's position. For these reasons, the ExA was satisfied that the suite of documents prepared by the Applicant in respect of kittiwake compensation represents a robust and thorough approach. Crucially, if the levels of productivity cited by the Applicant come to fruition, this would support the sustainability of the kittiwake population and ensure the coherence of the NSN. The ExA are confident that the compensatory measures would protect the coherence of the NSN as required by Regulations 64 and 68.

In response to the Secretary of State's first consultation letter, the Applicant provided an updated Revision E[73] of the Habitats Regulation Assessment Derogation and Compensatory Measures Update (the updated CMU) (revision D - [REP8-040]) which details the ongoing consultation undertaken by the Applicant and further refinement of engineering design of the Saltmeadows ANS enhancements since the close of Examination. The Secretary of State welcomes this update and is comforted to see the ongoing support from Gateshead Council, as the owner of the Saltmeadows ANS, landowner and LPA, regarding the proposals.

The Applicant has consulted with the Council and Northumbria Ringing Group on initial designs. Feedback from both parties led to an amendment to the tower designs as concerns were raised with regards to access for monitoring using a cherry picker / mobile elevating work platform. It was also raised that being able to retain the least productive face and its ledges would be desirable for aesthetic reasons and also because the oldest kittiwake known to nest on the structure nests on that face. As a result, the Applicant provided additional tower modification options for consideration, which were positively received by both the LPA and the Ringing Group.

The latest modification includes the positioning of new panels below the existing panels. This arrangement ensures that the current access provisions remain unchanged and thus does not present increased access challenges. The Applicant submitted the pre-application consultation to Gateshead Council on 20 June 2023 to secure feedback on the proposals whilst, in parallel, progressing the concept design. The Applicant received the pre-application consultation feedback on 06 September 2023. The feedback received from the council was positive and did not raise any major concerns with regard to the proposals. Following receipt of the feedback, the Applicant met with Gateshead Council and the Northumbria Ringing Group on 18 October 2023 to review the concept designs, discuss the pre-application consultation feedback and the future monitoring of the tower. The Applicant has since met with the Council to discuss the next steps regarding the submission of the full planning application in accordance with the outline programme in Table 4.4 of the updated CMU[73].

Since the close of Examination in July 2023, key stakeholders relevant to the DCO and the kittiwake tower have been updated through meetings arranged by the Applicant, as outlined in Appendix A: Detailed Habitats Regulations Assessment Derogation and Compensatory Measures Update Consultation Record of the updated CMU[73]. The Applicant is committed to continuing to engage with stakeholders as it prepares for submission of the planning application for the tower modification and refurbishment works. Regarding the engineering design of the proposed modifications to the ANS, the current design proposal has been further refined to maximise the productivity benefits of the ANS (Figure 2 (c)).

[73] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010109/EN010109-002273-13.7.1%20Habitats%20Regulation%20Assessment%20Derogation%20and%20Compensatory%20Measures%20Update%20Revision%20E%20Tracked.pdf

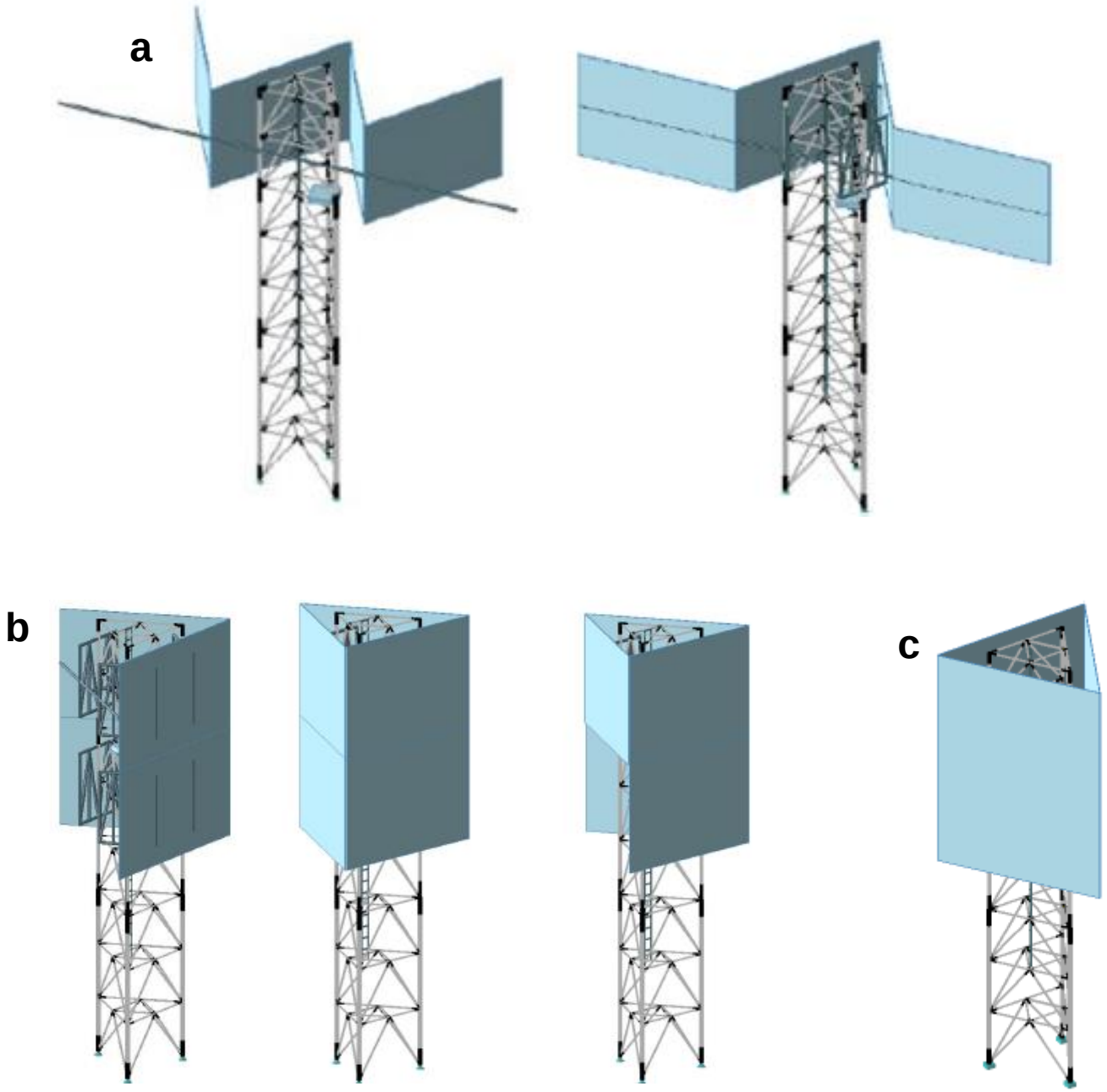

Figure 2: Design evolution of the proposed modifications to the Saltmeadows ANS. **This presents initial design options considered as part of the Phase 1 Inspection and Condition Assessment ((a), the horizontal line represents the south-facing side of the ANS), further iterations following consultation feedback from Gateshead Council at D 6 [REP6-010] (b) and the current preferred design option presented in the updated CMU[73] post-Examination (c).**

The Applicant is in the process of finalising the concept design following the pre-application feedback from Gateshead Council and Northumbria Ringing Group. The initial design options shown in Figure 2(a) and (b), have been refined and a preferred design has been selected following advice from Gateshead Council and Northumbria Ringing Group that their preferred option would be to add panels below the existing on all three faces, and for the panels and ledges

to mirror the existing arrangement. The preferred design is similar to the middle option in Figure 2 (b). This design hosts the maximum nesting capacity of the various options.

This optimisation of the design differs from that proposed in the kittiwake CMD [APP-072] in that the panel / ledges from the least productive face (southern) are now no longer proposed to be removed. As such, the number of nesting ledges proposed to be provided has increased and the quantity of benefits provided can at least be expected to be an extra 87 chicks as quantified in the 'Gateshead Kittiwake Tower Modification Quantification of Productivity Benefits (Revision B)' [REP3-087]. Once detailed design is undertaken and the actual number of ledges proposed to be installed is confirmed, the Applicant proposes that further quantification of benefits can be undertaken in consultation with the KCSG. The feasibility of all options is dependent on the supporting steel latticework and foundation being structurally sound, which initial surveys have suggested is the case.

The Applicant also notes that, as suggested and agreed with Gateshead Council, it is proposed to refurbish the existing faces and ledges at the same time as adding the additional ones. The tower was last refurbished between the 2010 and 2011 breeding seasons. The number of nests recorded in 2011 show an increase in those from 2010 and it can therefore be expected that the proposed upgrade of the tower would not, in and of itself, cause a reduction in kittiwake numbers in the breeding season immediately following the upgrade. Gateshead Council advised the Applicant by email on 10 November 2023 that a modest number of nests were retained and included to act as a visual cue for returning kittiwakes.

The Applicant recognises that NE and the RSPB have significant interest in the development of the design, and it has consulted on the designs with both following the close of the Examination. The Applicant intends to submit the full planning application in Q1 2024.

NE reviewed the Applicant's response to the first consultation letter including the updated CMU and updated its advice regarding the proposed measure in an updated version[74] of its End of Examination Position on the Applicant's Proposed Compensatory Measures [REP8-103]. NE advised that given the modest contribution of the Project to the in-combination AEoI of FFC SPA kittiwake and the evidence provided of a likely pool of kittiwakes currently experiencing low/limited productivity in the Newcastle Gateshead area, it considers that augmenting the existing tower at Saltmarsh is a suitable compensatory measure.

NE agrees that the updated design of retaining all existing panels/ledges in addition to three new panels is expected to increase the benefits above that as quantified by the Applicant in [REP3-087] and are supportive of the proposed design consisting of three new panels below the existing three. In light of the updated design, NE are also satisfied that there will be adaptive management measures available to ensure the long-term success of the measures. The Secretary of State notes that whilst NE advises that quantifying benefits to the FFC SPA kittiwake population or indeed other sites in the NSN is unlikely to be possible, it does not consider this to be a matter of concern. Given the positive engagement with Gateshead Council, it seems likely to NE that implementation can be achieved. The Secretary of State agrees and welcomes the letter of

[74] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010109/EN010109-002331-Appendix%201%20NE%20Updated%20Position%20on%20Applicant%E2%80%99s%20Proposed%20Compensatory%20Measures%2020%20Feb%2024%20Tracked.pdf

support from Gateshead Council (Appendix B of the CMU[73]) which confirms that, in principle and subject to planning permission, Gateshead Council supports the Applicant's proposal to modify the existing artificial nesting tower at Saltmeadows, Gateshead to enhance the breeding success of kittiwakes as part of compensatory measures. The council has actively engaged with the Applicant during the pre-Application and pre-Examination phases to assist in development of the proposal and believes the planned measure has strong ecological merit. The objectives of the proposal are also aligned with the council's long-term intentions for the site and will help to ensure the enhanced and continued success of the tower in supporting the local kittiwake colony.

The Secretary of State considers that NE's residual concerns at the end of Examination due to a lack of a detailed design concept have been adequately resolved by the provision of further detail post-Examination in the updated CMU. NE consider the measure to be ecologically and technically viable. A location for repurposing a structure has been identified and positive steps taken towards securing tenure and permissions. The scale of compensation required is agreed between NE and the Applicant, and NE is reasonably confident that the measure can deliver against its advised impact values.

Whilst NE are now largely supportive of the proposed design, the Secretary of State notes that NE would welcome further discussion with the Applicant, particularly regarding how kittiwake will be encouraged to recolonise the ANS following refurbishment and how the risk of highly pathogenic avian influence (HPAI) will be mitigated. She agrees with NE that such considerations are relevant and she is encouraged that the Applicant proposes to discuss these with the KCSG[73], for example to consider whether some nests can be retained to act as a visual cues for returning kittiwake and whether biosecurity measures such as ultraviolet light treatment could be implemented to mitigate the potential for spread of HPAI. She considers that these residual technical matters can be progressed through ongoing discussion with the KCSG and refined post-consent during detailed design and preparation of the kittiwake CIMP.

The sole remaining outstanding concern of NE is regarding the proposed 3-year lead-in time. NE advise[74] that, were a commitment to 4 breeding seasons made, it would have no remaining significant outstanding concern with the proposals. The Secretary of State acknowledges NE's advice that, as it takes 4+ years for kittiwake to reach maturity and recruit into the breeding population, the modifications to the ANS should be in place at least 4 years prior to the start of the impact (collision during operation) and that this advice is consistent with advice given for previous OWFs where ANS's were proposed. The Applicant agrees that ideally, a 4-year lead in time is provided and it commits to endeavouring to provide this [APP-072]. However, it also considers that a possible deficit could be offset by making simple adjustments to the scale of compensation, such that the necessary level of compensation would still be delivered over time. Any requirement to increase the scale of compensation, as well as steps to reduce it again once any deficit has been reduced to zero will be confirmed through the suggested programme of monitoring and adaptive management and agreed with the KCSG [APP-071] [APP-072]. The Secretary of State does not consider that the Hornsea Three Offshore Wind Farm (Amendment) Order 2023 should be considered as precedent for a reduced lead-in time as suggested by the Applicant and the ExA, as the package of compensatory measures in that case are distinct. Notably, the applicant for that project is required to construct four new ANS's along the English east coast, three of which are already constructed. The Secretary of State notes that NE makes

it clear in its advice[75] regarding proposed reductions to lead in-times for that project, that an appropriate lead-in time must be considered on a case-by-case basis. In considering this Project, as the compensation requirement is relatively modest and the Applicant is proposing relatively simple, but likely-effective enhancements to an existing ANS which is already shown to be utilised by kittiwake instead of construction of a new ANS, the Secretary of State agrees with the ExA and is content that a 3-year lead in time prior to the commencement of operation of the Project, as secured in Schedule 17 Part 2 paragraph 16, is appropriate in this instance. Nevertheless, whilst it is acceptable that the DCO secures a minimum 3-year lead-in time, the Secretary of State would encourage the Applicant to continue to aim to implement the proposed measures as early as possible, and ideally at least 4 years prior to commencement of operation as committed to in the kittiwake CMD [APP-072] to avoid the accrual of any mortality debt.

The Secretary of State notes the RSPBs concerns held at D1 [REP1-161] regarding the proposals and that these broadly aligned with the view of NE at that time. However, she is satisfied that matters raised have been adequately addressed at this stage and that further development towards gaining planning permission is amenable to progression post-consent. She notes that the RSPB did not comment on the further information provided by the Applicant regarding the kittiwake compensation in its response[76] to the first consultation letter.

Amendments to the DCO

The Secretary of State has amended Schedule 17 Part 2:

- paragraph 13 - to secure that the plan for the work of the KCSG must be submitted to and approved by the Secretary of State in consultation with all members of the KCSG, as suggested by NE;
- paragraph 15 (b) - to secure that the kittiwake CIMP must include details of landowner agreements, if relevant, demonstrating how rights will be obtained to install and maintain the measures at the site(s), to ensure that the measures can be secured;
- paragraph 19 - to secure that the results from the monitoring scheme must be submitted at least annually to the Secretary of State and the KCSG including the SNCB, as committed to by the Applicant in the kittiwake CMD [APP-072, paragraph 142]; and
- paragraph 19 - to clarify that the decision as to whether the measures are proving ineffective and adaptive management measures are required is made by the Secretary of State

Overall, having reviewed the information provided during the Examination, the additional information provided post-Examination and the responses of the consultees with regards to the compensation measure proposed for kittiwake, the Secretary of State is satisfied that the ecological efficacy of the measure is proven, the compensation level (mortality) and scale of compensation required to meet this level as identified are appropriate, and appropriate monitoring and adaptive management is secured to ensure the long-term success of the

[75] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-003695-EN010080%20463585%20Hornsea%203%20Non-material%20change%20-%20NE%20Response%20070224.pdf

[76] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010109/EN010109-002333-Royal%20Society%20for%20the%20Protection%20of%20Birds.pdf

measure. She is also satisfied that a lead-in time of minimum 3-years is appropriate in this instance. She welcomes and is encouraged by the Applicant's positive engagement with NE, RSPB, the Northumbria Ringing Group, and Gateshead Council as the LPA and landowner. Whilst a subsequent and separate planning permission will be required, she sees no reason to suggest that this would not be forthcoming based on the information available and positive engagement with Gateshead Council to date. She is satisfied that the ongoing role of the KCSG is adequately secured.

The necessary compensatory measures can be secured and delivered to protect the coherence of UK NSN for kittiwake as required by Regulations 29 and 36 of the Offshore Habitats Regulations and Regulations 64 and 68 of the Habitats Regulations. She considers that Schedule 17 Part 2 adequately secures the further work required to progress the proposed compensatory measure, including the approval of a CIMP.

9.3 Sandwich tern

The Applicant identified [REP8-038] a compensation requirement of 12-17 adult sandwich terns per annum against the 95% upper confidence limit prediction of the collision risk modelling. NE [REP5-092] [REP8-032] agreed with the estimates of collision risk and welcome the Applicants proposition to compensate for the estimated upper 95% CI. The Secretary of State agrees that a compensation requirement of 17 adult sandwich tern per annum is appropriate.

To provide this level of compensation, the Applicant's in-principle compensatory measures plan submitted at Application (RIAA Appendix 2 – Sandwich Tern Compensation Document [APP-069] [REP7-016 Revision B] (sandwich tern CMD) and Annex 2A – Outline Sandwich Tern CIMP [APP-070]) proposed the following measures:

- creation of a new habitat at Loch Ryan in Scotland, comprising a new inland lagoon for nesting and predator prevention measures;
- installation of nest boxes and shelters on the Farne Islands SPA, with erection of bamboo canes to deter predation; and
- potential payment into a strategic fund as alternative to project-led compensatory measures should the Government establish such a fund.

However, at the close of the Examination a new compensatory measure had been added for predator eradication at Blakeney in the NNC SPA (sandwich Tern CMD Revision B [REP7-016]. This was introduced initially at D5 [REP5-049, Q3.14.1.6] by the Applicant in response to negative feedback regarding the compensatory measures proposed at the Farne Islands. The Applicant was clear however that this measure was not a substitute for the Farne Islands proposals, and both proposals should be retained. This is considered further below.

Loch Ryan – inland pool creation

The Applicants approach to selecting an appropriate site is described in Annex 2B – Sandwich Tern Nesting Habitat Improvements Site Selection [APP-071]. The process was informed by a review of the conservation status of sandwich terns at all UK colonies, both within and outside of existing SPAs (Annex 1B - Sandwich Tern and Kittiwake Ecological Evidence [APP-066]).

This review was used in consultation with stakeholders to provide the evidence base to help guide the further development of the compensatory measures. It identifies that one site from which sandwich terns have been lost is Scar Point, Loch Ryan, Wigtownshire (Furness et al., 2013)[77] in Southwest Scotland. This is a site which, if restored, would significantly improve the geographical coherence of the sandwich tern breeding range in Britain and Ireland. There were 120 pairs nesting at this site in 1998 (JNCC, 2021)[78].

There is strong evidence that sandwich terns frequently seek new breeding sites and will move from their established breeding colony to another when environmental conditions encourage this (Courtens and Fijn, 2020[79]). There is therefore good reason to expect that providing new nesting opportunities at Loch Ryan will be likely to attract re-colonization by sandwich terns. This is what was seen when an artificial site was created at St John's Pool, Caithness, which has since been colonised by sandwich tern [REP7-016]. The birds at St John's Pool originated from many different Sandwich tern colonies from The Netherlands, England, Scotland and Ireland. The same can be expected at Loch Ryan. Since there seems to be frequent nonbreeding by adult Sandwich terns (Courtens and Fijn, 2020), provision of this new breeding opportunity is likely to increase the proportion of the population that chooses to breed rather than drawing breeding birds away from other established colonies.

Tracking studies show that breeding Sandwich terns generally forage in sheltered coastal waters (Perrow et al., 2011; Wilson et al., 2014; Perrow et al., 2017). They depend on sandeels and sprats to feed chicks. The sprat stock in the Clyde Sea Area is at a high level (Lawrence and Fernandes, 2021), providing a strong prey resource for terns, but there seems to be a shortage of suitable nesting habitat preventing sandwich tern recovery in west Scotland. Providing a nesting site in Loch Ryan would appear to fill that gap, without harm to any other interests. Restoring sandwich terns to nesting in Loch Ryan would not only provide compensation by increasing breeding numbers but would also have the very strong qualitative merit of restoring former breeding range of this species which has been lost [REP7-016].

The Applicant proposed [REP7-016] two delivery mechanisms for the nesting habitat improvements and restoration of lost breeding range at Loch Ryan: anchor a floating structure (pontoon) off the coast a short distance from the original island; and create an inland pool ('lochan') a short distance from the original island. The Applicant considers both to have ecological merit but acknowledges the lack of evidence that sandwich tern would indeed colonise a pontoon. The creation of an inland pool would follow the successful approach adopted at St John's Pool, Caithness, which the Applicant considers to be a model for its proposal. NE and the RSPB indicated a strong preference for the inland pool option, due to a lack of confidence that sandwich tern would utilise a pontoon. The Applicant acknowledges NE [RR-063] [REP8-032] and the RSPBs [REP1-162] advice and agrees to progress the inland pool as the preferred option.

[77] Furness, R.W., MacArthur, D., Trinder, M. and MacArthur, K. 2013. Evidence review to support the identification of potential conservation measures for selected species of seabirds. Report to Defra.

[78] JNCC 2021. Seabird Monitoring Programme online database. Seabird Monitoring Programme | JNCC

[79] Courtens, W. and Fijn, R.C. 2020. Site fidelity of Sandwich terns *Thalasseus sandvicensis* in the northern Delta area, southwest Netherlands. Limosa 93: 173-179

The Applicant considers [REP7-016] [REP8-038] that if sandwich tern recolonised, the measure is capable of supporting at least 120-150 breeding pairs, producing about 100 chicks per year (equivalent to 38 adults recruited into the breeding population) which is more than sufficient compensate for the predicted impact of the Project. NE consider [REP5-092] [REP8-032] 120-150 pairs to be an appropriate, if challenging target. However, in its end of Examination position on the compensatory measures [REP8-103], NE remained concerned that the proposed size of the lagoon and overall size of the habitat restoration (lagoon and buffer); it would have greater confidence in the success of the scheme if a larger area of water / buffer land was delivered and continued to urge the Applicant to consider this.

The Applicant states [REP7-016] that one adaptive management measure could be to increase the size of the pool and number of islands if the evidence indicated that breeding numbers of birds were being constrained by the size of the created habitat.

The Applicant confirmed support from Dumfries and Galloway Council for the proposed measure [REP5-050, Appendix A.1] and provided a Letter of Support from the council dated 13 June 2023 at Appendix C. The Council confirms that in-principle and subject to planning permission, it supports the Applicants proposals to provide compensation for sandwich tern at Loch Ryan as part of compensatory measures. The Council has actively engaged with the Applicant during the DCO process to provide consultation feedback on outline options for sandwich tern compensation at Loch Ryan. It welcomes the consultation that has been undertaken to date and looks forward to further engagement as the detailed designs are progressed. The Applicant also confirmed that the landowner was negotiating on Heads of Terms for the acquisition of the necessary land to deliver the compensatory measure. The Applicant also recorded that NatureScot had indicated support during pre-Examination consultation on 12 October 2022 [REP5-049, Q3.14.1.1]. The ExA approached NatureScot for comment within third written questions [PD-017] and notified the organisation that the RIES had been published, but no engagement was received.

The Applicant provided a legal opinion on the availability and use of compulsory acquisition powers under the Electricity Act 1981 to acquire the site at Loch Ryan should voluntary agreement not be reached [REP4-043]. Counsel's opinion was that, as a last resort, compulsory acquisition powers could legally be pursued in connection with the delivery of compensatory measures at Loch Ryan (or indeed any site beyond the Order limits). In addition, the Applicant reassured the ExA that the definition of "implementation" used within Schedule 17 (Parts 1, 2 and 3) in the context of the compensatory measures, meant the point that the undertaker has completed construction or delivery of the relevant compensatory measures [REP5-049, Q3.14.1.14].

More detail on the potential inland pool was provided close to the end of the Examination [REP7-016, section 7.4.4, Figures 7-2 and 7-3], with four indicative locations shown each exceeding 2 hectares (ha) in size. The Applicant produced a technical note to demonstrate that the compensation of 12-17 sandwich terns per annum would be achievable through the Loch Ryan site alone [REP7-053]. The Applicant considers that the design of the inland pool should be based on the example of St John's Pool, Caithness and experience of sandwich terns nesting on dredge-spoil islands created in Lagoon of Venice and in sites in North Carolina and Texas. Regard has also been given to some 'broad design principles' provided by the RSPB ahead of the June 2022 ornithology compensation ETG meeting (see Annex 1D - Record of HRA

Derogation Consultation [APP-068]). Design principles of the inland pool would include the following:

- A pool of at least 80m diameter containing two or three islands of at least 15m diameter, encompassing a total area (water and islands) of at least 1 hectare (10,000m^2). The pool would also be surrounded by a buffer (of land or water but preferably water) that would ensure minimal human disturbance to birds at the pool. While a larger pool and more or larger islands would make this site of greater value for biodiversity enhancement, there is little evidence to suggest that a larger pool or larger islands would increase the likelihood of sandwich terns recolonizing. In many locations sandwich terns have chosen to nest on very small islands, with the key features being lack of human disturbance, lack of access for mammal predators and lack of vegetation in areas where the birds nest but some cover nearby that protects chicks from avian predators. On this basis, a buffer area surrounding the pool that keeps human disturbance away from the colony is considered more important than size of pool or islands. At St John's Pool over 100 pairs of sandwich terns nest on a small pile of sand just 100m^2, together with 20 pairs of common terns, two or three pairs of Arctic tern and 30 pairs of black-headed gulls (Hughes et al., 2021[80]). Provision of several small islands in a pool would give scope for attracting similar numbers of sandwich terns to the numbers that were present in the 1990s (for example 120 pairs in 1998). The size of the pool would be designed in order to accommodate any potential need in the future to increase the area of islands within it, as part of the adaptive management approach described in Section 7.4.7 [REP7-016].
- The pool and the islands within it would have irregular edges with mounds of gravel or sand, to give birds a choice of substrates and positions in relation to the water.
- Water depths between the islands within the pool would be up to approximately 1.5m.
- High quality predator-proof electric fencing surrounding the entire perimeter (which would be in the order of 600m in length).
- Appropriate measures to feed the pool with water and, if considered necessary, to provide aeration. It may be possible to construct a freshwater pool using water from the Corsewall Burn for example to maintain the level in the pool. However, another option may be to construct a pool with the water level maintained by tidal valves with a pipe connection to the sea in Loch Ryan. A decision on this element of the design will be informed by land agreement considerations during the detailed design stage and in consultation with the Sandwich Tern Compensation Steering Group (STCSG).

The STCSG will be formally established once consent has been granted to oversee the development, implementation, monitoring and reporting of the compensation [REP7-016]. Core members of the STCSG, depending on the option taken forward, will include the MMO, Marine Scotland, NE, NatureScot, and Dumfries and Galloway Council. The RSPB will also be invited to participate. Other stakeholders that will be consulted and kept informed on an ongoing basis include, depending on the option taken forward, Crown Estate Scotland, local conservation groups, local ornithologists, the local fishermen in Loch Ryan, ferry operators and recreational boating interests.

Numbers of terns nesting on the inland pool islands or pontoon will be monitored each May-June, for the operational lifetime of SEP and DEP. It would be preferable to do this using a drone

[80] Hughes, R.D., O'Hanlon, N. and Smith, J. 2021. Colonisation of St John's Pool, Caithness by terns and gulls. Scottish Birds 41: 205-212.

to photograph the birds present, following best practice as recommended by Spaans et al. (2018)[81] and by Valle and Scarton (2021)[82]. This would also allow monitoring of breeding success achieved by the birds. Monitoring of predator interactions would also be undertaken through regular checks within and outside of the predator-proof fence for evidence of predator activity. Methods may include searches for signs (such as tracks and droppings), scanning at night using thermal imaging equipment, and/or use of trail cameras. Regular monitoring and maintenance of the predator-proof fence will also be undertaken, to include regular checks of the integrity of the fence, evidence of crossing by predators and, if electrified, checks of vegetation and fence voltage (both during and outside of the breeding season).

The Applicant's proposals include adaptive management [REP7-016]. It proposed to work with stakeholders through the STCSG to develop the final CIMP for approval by the Secretary of State in consultation with the SNCB. An outline version of the CIMP was provided at application and was updated during Examination, with a final version submitted at D7 [REP7-017]. The Applicant [REP7-017, Section 2.4] states that in the final version of the CIMP this will identify the monitoring and adaptive management principles and processes, including the situations where further adaptive management measures would be required. NE [REP8-032] recognised the potential value of adaptive management and notes that ongoing measures would be agreed with the STCSG, but it was concerned that the lack of detailed site designs limited its ability to determine full monitoring requirements. Notably, NE advised that monitoring should commence once the measures are implemented and be for the length of time management is required, i.e. potentially beyond the Projects operational period, as per mortality debt requirements.

NE [REP8-032] [REP8-103] are generally supportive of the proposals, noting that the measure is likely to be ecologically effective, has the potential to restore a sandwich tern colony in part of its previous range, increase the number of recruits into the wider sandwich tern population and support a sufficient quantum to compensate for the adult mortalities identified. NE agrees with the suitability of Loch Ryan and the identified sites within it. However, NE flagged deficiencies in the information before the Examination, requesting further detail regarding the tenure, location, design and operation of the inland pool for stakeholder comment [REP5-092]. Whilst NE accepted that sufficient space is proposed to accommodate a breeding population approximating that which was present at the site historically and would be expected to address the estimated impact, NE urged a 'more ambitious' approach to lagoon habitat creation. At the close of the Examination, NE concluded [REP8-032, REP8-103] that: *"… despite making some progress towards identifying a site, the Applicant has not confirmed or agreed tenure for a specific location nor provided a detailed concept design concept to the Examination. In the absence of such information, Natural England advises that the measure cannot be considered secured. Furthermore, the concerns in Natural England's relevant representations regarding the design principles that relate to the setting of the proposed nesting islands (open water or open land) have not been addressed during the Examination, meaning that without the Applicant adopting*

[81] Spaans, B., Leopold, M. and Plomp, M. 2018. Using a drone to determine the number of breeding pairs and breeding success of Sandwich terns *Sterna sandvicensis*. Limosa 91: 30-37.

[82] Valle, R.G. and Scarton, F. 2021. Drone-conducted counts as a tool for the rapid assessment of productivity of Sandwich terns (*Thalasseus sandvicensis*). Journal of Ornithology 162: 621-628.

a more expansive approach to habitat creation, we have insufficient confidence that the habitats created will be sufficiently attractive.".

The RSPB advised that it remained concerned that insufficient evidence has been provided by the Applicant on the feasibility and effectiveness of the Loch Ryan proposals to support the conclusion that the proposals would be sufficient to maintain the coherence of the NSN [REP8-116].

The Applicant considered that the Loch Ryan proposals would represent a major qualitative conservation gain adding resilience of the wider NSN and therefore there is a high degree of confidence in the ecological merits of this measure. The Applicant further summarises that negotiations are ongoing, outline design requirements have been agreed and the future ongoing timetable takes account of the need for other consents and licences [REP8-062 paragraph 182-183].

Farne Islands – improving breeding success

Up to D4, the Applicant proposed measures at the Farne Islands SPA where it was reported that the existing sandwich tern population was suffering severe decline [REP2-017 paragraph 171]. The National Trust, which manages the Farne Islands, objected to the measures on the basis they did not represent additionality to the measures already being promoted through the draft Farne Islands Management Plan 2021 [AS-042]. There was also little evidence to suggest that the installation of bamboo canes was an effective way to deter predation. NE reinforced the National Trust's position.

The Applicant quoted the Energy Security Bill insofar as: "Government is also considering enabling developers to undertake work already identified by Government to improve the condition of protected species and habitats. This would substantially increase the number of measures available to developers and also accelerate marine recovery for some sites" [REP2-043]. It was the Applicant's view that the Farne Islands Management Plan would become a government document and thus the Applicant would be eligible to pursue its proposed compensatory measures without the need to demonstrate additionality.

However, both NE and the National Trust disputed the status of the Farne Islands Management Plan, with the National Trust explicitly stating that the Farne Islands were not available to the Applicant [REP5-088, Q3.14.1.4]. The Applicant recorded disappointment at the lack of stakeholder support for the measures at the Farne Islands but wished to retain the proposals as part of the overall package of compensatory measures for sandwich terns [REP5-049, Q3.14.1.6]. This retention was to ensure resilience was provided in case other measures prove unfeasible or unsuccessful and because the Applicant believes further clarity on additionality, soon to be forthcoming in updated Defra (in full) guidance on compensation, would demonstrate the Farne Island proposals have merit. The National Trust confirmed that, if the Applicant sought in the future post-consent to compulsorily acquire land within the Farne Islands to deliver the compensation under the Electricity Act [REP4-043], that it would strongly object and thus trigger special parliamentary procedure [REP5-088, Q3.14.1.5].

The Secretary of State considers that the position of NE and the National Trust as landowner raises significant doubt as to whether the Applicant could deliver the proposed measures on the Farne Islands. She therefore cannot rely on the proposals at this time, although noting that this does not preclude the Applicant from exploring the measure further and attempting to reach

common ground with NE and the National Trust and other IPs post-consent and in preparing the sandwich tern CIMP.

Blakeney Point – predator control

The Applicant reported being invited to a meeting with National Trust and NE on 8 June 2023 to reopen discussions regarding an additional potential compensatory measure at Blakeney Point within the North Norfolk Coast SPA [REP5-049, Q3.14.1.6]. The Applicant explained that discussions had taken place on potential compensatory measures in the pre-application phase of the Project, but had been discounted [EV-098, EV-102]. However, as confirmed by the National Trust, sandwich terns had failed to breed at Blakeney Point in 2022. Normal site management measures had not successfully identified or resolved the problem, but the failure of the species to breed was largely believed to be a result of an increased rat population resulting from an increase in seal carcasses [AS-067].

A comparison of populations at Blakeney Point and Scolt Head post-2000 (Figure 3 a) illustrates the 'switching' of populations between the two colonies during this period, and also the abandonment of the Blakeney colony in 2022, which was not accompanied by the respective increase at Scolt Head that would be expected if birds had relocated to the alternative colony. Figure 3 b illustrates productivity at the colonies over the same period. It is noted that there can be significant inter-annual and inter-colony variation in productivity.

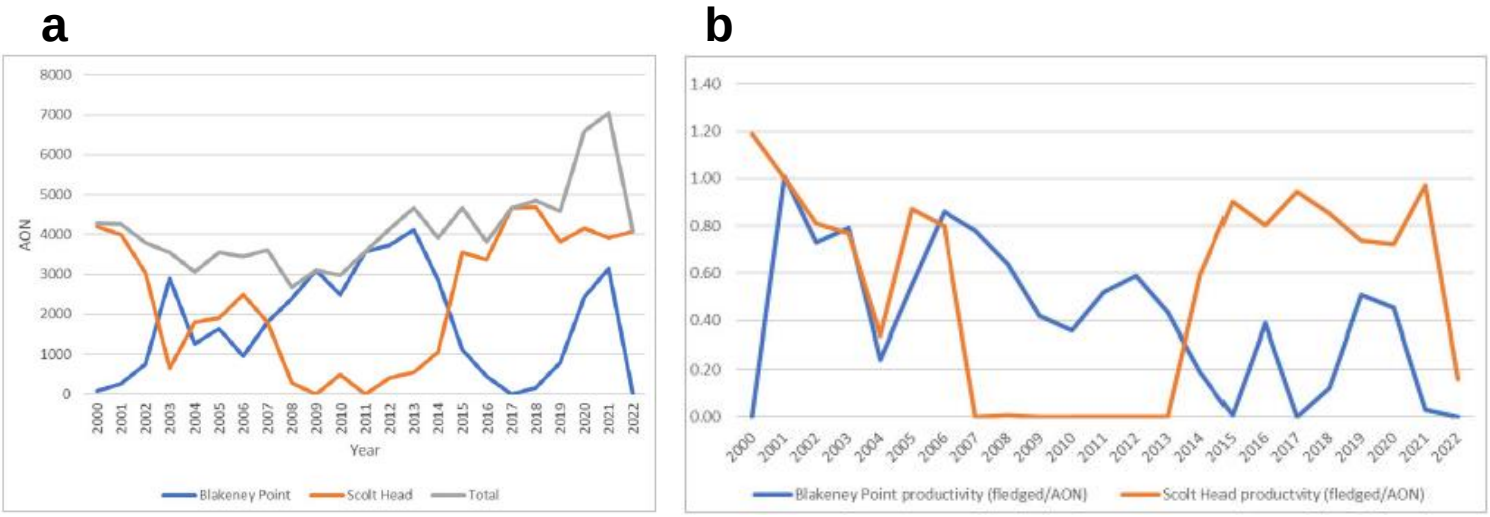

Figure 3: Number of AONS (a) and productivity (b, fledged birds per AON) of sandwich terns nesting at North Norfolk coast since 2000. Reproduced from the sandwich tern CMD [REP7-016].

The Applicant therefore provided an initial draft proposal for this compensatory measure and an accompanying plan in the updated sandwich term CMD (Revision B) [REP7-016]. The Applicant highlighted that this work is necessarily at an early stage of development and the proposals will be subject to further development following the close of the Examination.

In summary, the compensation would comprise the delivery of research, trial and implementation of predator control measures (focussed on rats, but also considering other species including fox, stoat and large gulls), and monitoring of implemented measures to manage or reduce sandwich

tern (and black-headed gull) nest predation and increase the likelihood of black-headed gull (and hence sandwich tern) settling at the colon. NE confirmed that this would not be subject to additionality concerns, as options for existing best practice management have been exhausted, and that the proposals have the potential to deliver benefits that are above and beyond normal site management for managing the colony. They could also deliver new best practice (and hence benefit) for similarly challenging sites in the wider NSN. It is proposed [REP7-016] that the measures are delivered iteratively, informed by an expert panel of UK and international specialists in the field of rat/predator management. The panel would be convened at an early stage, and that this expertise would be used to develop and inform the compensation proposals. The expert panel would continue to provide advice throughout the life of the project, as required. In addition, oversight of the Blakeney compensation proposals would be provided via the STCSG. At this stage, therefore, the full detail of measures cannot be confirmed, but potential elements are suggested [REP7-016 paragraph 204 and section 7.6.5].

It is anticipated that the desk study, literature review and advice from the expert panel could be implemented to undertake the first trials in the 2025 breeding season; however, the Applicant will seek to begin these in 2024 if possible, depending on the timing of consent approval and the Secretary of State's approval of the sandwich tern CIMP. Subject to advice from the expert panel, it is anticipated that a minimum of two seasons of trials would be undertaken (i.e. in 2025 and 2026), plus winter monitoring of rat diet. However, the trial period may extend beyond this time and/or run in parallel with implementation, and will also be dependent on other external factors, including HPAI. Depending on the outcome of trials, it would be expected that full implementation of predator control and management measures would commence in 2027.

Delivery of the proposed measures throughout the lifetime of the operation of SEP and DEP will be subject to agreement with the National Trust and NE in relation to any activity at the Scolt Head colony. As above, these works would be in addition to existing site management, which National Trust would continue to deliver. The Applicant would be responsible for the delivery of the desk study (including contracting of appropriate specialist consultants) and convening the expert panel meetings, and would work with the National Trust, NE and other relevant parties to deliver implementation of site trials, monitoring and subsequent evaluation and long-term delivery of management/predator control measures. The Applicant would be responsible for ensuring that the required financial resources were available to the National Trust and other delivering partners for implementation of on-site works, including long-term implementation of successful measures. The Applicant would be responsible for final outputs (trial reporting and publication of best practice), working with the National Trust and other partners as appropriate.

The RSPB, NE and the Applicant agreed that management of the rat population at Blakeney Point is challenging (particularly when compared to island populations) given potential colonisation routes along the spit and across Blakeney Harbour (the latter within swimming distance by rats), and the difficulty in removing seal carcasses [REP7-016, Paragraph 202]. All parties, however, recognised the benefits of intervention [REP8-032, REP8-044, REP8-116], although the RSPB considers that it has not been demonstrated that there are any measures which would be additional to those necessary to achieve favourable condition. NE [REP8-032] broadly agrees with the analysis of the predation issues at Blakeney Point provided by the Applicant in the sandwich tern CMD and Annex 1B - Sandwich Tern and Kittiwake Ecological Evidence document [APP-066], although it acknowledges the inevitability that there is some uncertainty regarding whether there are ecologically effective measures to control predation at

this location based on the information available. NE also agrees with the scope of the proposals as set out in the sandwich tern CMD and that whilst a considerable amount of further development is required, an appropriate framework has been set out to achieve the required level of detail. NE agrees that DCO Schedule 17 Part 1 is suitably worded to secure this.

9.3.1 ExA and the Secretary of State's conclusion

The ExA recommended [ER 26.10.77 et seq.] that only the Loch Ryan proposals are suitably supported and explained to a degree that confidence can be given to them as a potential beneficial ecological measure. This is because the proposals at the Farne Islands have no support from key stakeholders and the proposals at Blakeney are early in conception and face numerous practical challenges. Given the limited information presented by the Applicant, the ExA does not consider that much reliance can be placed on the proposals for adaptive management. Therefore, the ExA considered there is reliance on a single compensatory measure, which represents a high-risk strategy should it fail or underperform. Based on the information submitted into the Examination, NE could not conclude that the measure would be suitable as a sole measure [REP8-103]. It also queried whether sufficient compensation would or could be provided, noting that the Loch Ryan scheme is at present some way from being secured [AS-041, point 5iv]. The ExA advocate a precautionary approach and consider that, whilst Loch Ryan has potential tangible ecological benefits in increasing the geographic spread of the sandwich tern population, there is insufficient clarity on the proposal to justify the confidence that the Applicant places upon the measure. The ExA was not confident that a package of compensatory measures is in place which would protect the coherence of the NSN as required by Regulations 64 and 68. The sandwich tern feature of the FFC SPA would therefore be irreparably harmed, with an AEoI occurring without suitable or sufficient compensation. The ExA recommended [ER 26.10.134] that considerable additional work is required on the design and detailing of the inland pool at Loch Ryan, including progress towards acquiring the land, to demonstrate a clear and secure route to consenting, implementation and long-term management.

Loch Ryan

In the first consultation, the Secretary of State invited the Applicant to provide further information on the design principles and details of the inland pool at Loch Ryan, including progress towards acquiring the land. This should include information on the feasibility and effectiveness of the habitats to be created and that they will be sufficiently attractive for nesting sandwich terns. Information provided should demonstrate a clear and secure route to implementation and long-term management.

The Applicant[73] provided an update on the consultation and further developments undertaken since the close of Examination. The Applicant confirmed that public consultation events were planned for Q1 2024, with venues and dates secured locally in Kirkcolm and Stranraer in February and March. The Applicant had also booked a venue to host a drop-in session in Stranraer in late January 2024 to allow local stakeholders such as councillors and Members of Selected Parliament to discuss the proposals with the Applicant in person. The Applicant is committed to continuing to engage with the local community and stakeholders throughout the next phases of development.

Regarding further planning, licencing and consents required, the updated designs (see below) were submitted to Dumfries and Galloway Council (the LPA) and the Marine Directorate to help inform an EIA Screening request made on 18 October 2023. The LPA and Marine Directorate confirmed on 04 December 2023 and 13 December 2023 respectively that the proposals do not constitute EIA development. Environmental survey work to inform the planning application and engineering design has been undertaken. A Preliminary Ecological Appraisal (PEA) at a location within the preferred AoS (Figure 3 in Appendix A - Supporting Figures for the Applicant's Responses to Relevant Representations [REP1-035]) was undertaken on 06 February 2023. The results of this survey confirmed the need for further Phase 2 ecological surveys to inform further site selection, development of concept designs, EIA Screening and Scoping (if required), and formal preapplication consultation with the LPA. The Applicant has since completed the following further surveys:

- National Vegetation Classification (NVC) survey;
- otter, badger, reptile, breeding birds and water vole surveys; and
- preliminary bat roost assessment of trees.

NVC surveys which were undertaken on 31 May and 01 June 2023 identified communities listed by Scottish Environmental Protection Agency (SEPA) as representing both highly and moderately groundwater dependent terrestrial ecosystems (GWTDE). These habitats were considered to be important at the County Level given the species diversity present, while swamps, marshes and reedbeds are all listed in the Dumfries and Galloway Local Biodiversity Action Plan (LBAP) as local priority habitats. SEPA is the competent authority in Scotland with respect to the management of potential impacts on GWTDEs. The Applicant held a teleconference with SEPA on 27 July 2023 where they stated that removal of these habitats to facilitate construction of the inland pool, without first considering alternatives or putting in place either protection measures or suitable compensation, would very likely lead to an objection by SEPA to any planning application. SEPA also had no knowledge of where compensatory GWDTEs had been provided on alternative projects of similar size and type, noting that most GWDTEs were linked to wind farm developments where re-siting turbine foundations was the most feasible solution to protect such habitats. Of the options presented by the Applicant, shown in Figure 7.2 and 7.3 in the sandwich tern CMD [REP7-016], SEPA advised that the Applicant progress the option to the north of the Corsewall Estate, avoiding the GWDTE areas.

The Applicant agrees and has therefore been making progress towards submission of a planning application for an inland pool in this area. The Applicant details its preferred location and a concept design of the proposed pool creation and buffer area (Figure 4[83]).

[83] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010109/EN010109-002276-23.3%20Sandwich%20Tern%20Compensation%20-%20Loch%20Ryan%20Inland%20Pool%20Site%20Location%20and%20Concept%20Design%20Figures.pdf

Figure 4: Loch Ryan concept design. See [83] for higher resolution images.

In addition to planning permission and potentially a marine licence, the Applicant recognises that it would also require a controlled activity regulations licence from SEPA as well as a Marine Works Consent from Crown Estate Scotland (subject to any relevant exemptions applying). Both would be progressed pre-construction and following consent award.

The Applicants current proposals are to increase the overall site area from 2.02ha to 3.9ha, with proposals to remove the southeastern woodland and agreements to secure a greater portion of the landowners grassland field. A key consideration in the design of the inland pool is water quality. Ensuring adequate hydraulic turnover, and thus avoiding stagnation of water has been factored into the proposals by the Applicant. The pool has been designed, at concept design stage, to allow an influx of sea water with every tidal cycle, and this will be by two inlet pipes with non-return valves to allow flow into the pool during high tides, and one outlet pipe and non-return valve to allow discharge of flow during low tides (Figure 4). This arrangement is by gravity and has with very few moving parts; it has the potential to operate in perpetuity with only occasional maintenance to ensure the non-return valves are not leaking or blocked.

It is estimated that with two 450mm inlet pipes set to 1.0m above ordnance datum, and the outlet weir controlling overall water level in the pool set at a similar level, it will take between 2.5 to 8 days for complete hydraulic turnover of the pool. This varies depending on tidal conditions that vary with weather and through the astronomical phases of the naturally occurring tidal cycles. It is also intended that the outlet control will be variable in order to allow adjustments when required and to allow partial drain-down for maintenance.

Access to the islands will be minimal, but necessary for occasional maintenance, and the detailed design will provide access routes that will be below normal water level, but capable of occasional vehicle/excavator passage. This route is proposed to start from a constructed ‘spit’ of land that will become obvious during the lower tidal cycle of the pool (Figure 4). Detailed design will include more exact calculations and levels to confirm construction details and requirements, including the need for a liner.

Landowner discussions have continued to progress positively in line with the letter of support from the landowner of the chosen site to the north of Wig Bay. Negotiations on draft Heads of Terms are ongoing and the parties hope to be in a position to agree terms early in Q1 2024, as indicated in a further Letter of Support dated December 2023 from the landowner of the Coreswall Estate which is provided in Appendix E of the updated CMU[73]. The letter reiterates the support of the landowner indicated in the first letter of 19 June 2023. The Letter of support explains that the landowner has been in discussions with the Applicant in connection with the inland pool proposal since August 2022. Over that time, the two parties have discussed the general terms of the agreement required for the Applicant to lease the land and the practicalities of how the scheme can be designed to fit within the wider landholding and activities of the Corsewall Estate as well as the wider local community. That work has also involved discussions and site visits with statutory bodies and regulators to identify where there may be areas of particular ecological value within the estate and how the scheme could work around those without impinging on the Estate's wider activities. Following that work over several months, the

Applicant have now identified a suitable location and design that, while it is evolving and is still to be finalised, is supported in principle by the Corsewall Estate.

The Applicant's continued development of the proposal included a site visit to St John's Pool, Caithness, in October 2023, which the Applicant considers to be a model for the Loch Ryan proposal. Sandwich tern unexpectedly colonised the site in 2007, which was not designed with the intention of attracting this particular species and they have been consistently breeding there since. The landowner has made design changes to the pool over the years to improve the site for breeding birds. Examples of modifications include increasing its size, the arrangement and number of islands, and the types of substrates used. The Applicant considers that St John's Pool has key similarities to the proposals at Loch Ryan, namely being a similar size (St John's Pool ~ 0.5ha, Loch Ryan ~1.55ha), both being located near a loch and open sea and both with trees near the pool. During the Applicant's visit to St John's Pool, the landowner provided a detailed tour of the reserve, offering guidance and advice that has fed into the Applicant's concept design and that will be considered further during detailed design. This advice has been incorporated into the concept design (Figure 4) and includes, for example, inclusion of a tidal 'spit', a small freshwater pool, digger/vehicle access track to the islands for maintenance, consideration of the types of substrate to be used on the islands that will be most attractive to sandwich terns, use of sandwich tern lures, predator management considerations, maintenance requirements and how to optimise public viewing. Alongside the more detailed concept design recently provided by the Applicant is further information on the maintenance and adaptive management considerations, including details on how water quality will be maintained, and access routes for maintenance of the islands.

The Secretary of State notes that following the further information provided post-Examination, NE[74] retain some concerns regarding the design of the site including proximity to an area of woodland and the openness of the landscape. NE queried whether there are potential implications due to the proximity of the ancient woodland to the west of the inland pool location, which could support terrestrial and avian predators with the potential to impact on the nesting success of the sandwich terns.

The Applicant notes the concerns raised by NE with the current concept design during the most recent meeting held between them on 31 October 2023, which the Applicant sought to address in its updated CMU[73]. Regarding proximity of the proposed site to woodland, the Applicants ornithologist has undertaken further research and has corresponded with other experts on tern ecology in Europe to determine whether proximity of woodland could be a constraining factor in attracting sandwich terns. The research is said to have found most sandwich tern colonies are in areas without trees because sandwich terns require open ground with very little or no ground vegetation for their nests. Such sites tend to be gravel islands, shingle spits, sand dune habitat, bare islands within coastal lagoons, bare islands within salt pans (in the Mediterranean), or bare islands of sandy dredge spoil (in southern USA). It is noted that such habitat is not normally close to areas of woodland, so there is perhaps a perception that sandwich terns avoid nesting close to woodland. However, this is probably a consequence of the very strong preference of sandwich tern for nesting on bare ground in locations away from ground predators and human disturbance. There are in fact several examples of sandwich tern colonies on typical bare ground sites but close to woodland. Sandwich terns colonised the St John's Pool Nature Reserve artificial islands in Caithness which covers an area of approximately 1ha (actual pool area

approximately 0.5ha) which also has a patch of trees 70m from the nesting area and between the nesting islands and the open sea and so on the flight line used by terns from that colony. The St John's Pool Nature Reserve also has a high hedge around half of the pool, that could also create a barrier to terns if they were influenced by such features. The woodland and hedge have not been considered to be damaging to the tern conservation interest of that site and the breeding by Sandwich terns appears to have been entirely unaffected by the presence of trees and hedges close by, although it is noted that crow predation is not known to be a major issue at St John's Pool. The important Sandwich tern colony at Cemlyn Bay, Anglesey, the only colony of Sandwich terns in Wales and largest colony in the west of Britain, also has a small patch of woodland and a larger area of scrub bushes about 50m from the tern island. Management of Cemlyn Bay has focused on an electric fence around the main tern island to prevent mammal predator access and maintaining the island ground vegetation to be short enough for Sandwich terns and has not involved removal of nearby woodland or shrub habitat. In addition, control of avian predators is not understood to have been required at Cemlyn Bay (Tern Life Project, 2017).

Research carried out in the south of France (Schwartz et al., 2023), did not consider the presence of woodland near to newly created nesting habitat to have any influence on colonisation probability, and so that factor was not included as a variable in the testing of factors affecting colonisation success. Furthermore, a leading expert on sandwich tern colonies in France, Dr N. Sadoul, stated during an email exchange with the Applicant's expert ornithology consultant on 14 November 2023 that: (Pers. Comm.) "I don't think that the presence of woodland near managed islets is a significant barrier to colonisation by this species". Dr Sadoul highlighted two colonies of sandwich tern in the south of France that he knows well that are located relatively close to woodland. Dr Sadoul commented that sandwich terns might avoid nesting in areas where there are large numbers of crows or long-eared owls, as those can be important predators of tern eggs and chicks respectively, but do not seem to show avoidance of nearby woodland where this happens to be present near to suitable nesting habitat.

NE also questioned the potential for high salinity levels within the pool. The Applicant considers[73] that the prospect of any significant fluctuation in salinity from the normal sea water of Loch Ryan is unlikely, although some dilution of this may be introduced with freshwater input from an existing field drain that runs directly to Loch Ryan. By intercepting this it will be possible, and may be desirable, to add this freshwater input to the pool as shown on concept design (Figure 4). This opportunity was introduced to the Applicant by the landowner who is supportive of such a measure. Therefore, on balance it is considered unlikely that salinity would be an issue, options are available to manage it if required and, in any case, this would be monitored and managed through the existing commitments to monitoring and adaptive management as described in the sandwich tern CMD [REP7-016]. Further, a saline, tidally linked system is desirable in that it will reduce vegetative growth in the pool and on its islands, reducing the potential for deoxygenation and reducing maintenance (i.e. vegetation clearing) requirements. Further information on the details of the hydrology is provided in Section 4.3.1.4 of the updated CMU.

The Secretary of State considers the Applicants responses to be reasonable, suggesting that proximity to woodland and salinity levels are unlikely to hinder the success of the measure.

NE[74] acknowledge that the evidence provided by the Applicant does demonstrate that these aspects does not necessarily preclude use by sandwich tern. NE also note that a visit to Loch Ryan is currently planned for March 2024 which it hopes could ally some of its concerns by being

able to see the site in-person and provide advice on potential improvements. The RSPB[84] notes the ongoing development and stakeholder engagement but considers that uncertainties as to the effectiveness of the Loch Ryan proposal remain. NE considers that some detail is still lacking regarding ongoing maintenance, specifically with regards to maintenance of the predator-proof fence and vegetation on the islands, and the scale of the proposed site. NE agree with the proposed monitoring and success criteria, noting that colour ringing of chicks has the potential to provide information regarding whether birds from Loch Ryan are recruited into other SPAs within the NSN, although it acknowledges and agrees that quantifying this may prove difficult.

The Secretary of State recognises NE's remaining concern regarding the proposed size of the lagoon and buffer and that it would have more confidence in the success of the scheme if a large area was provided. However, the Secretary of State notes that one adaptive management measure proposed by the Applicant could be to increase the size of the pool and number of islands if the evidence indicated that breeding numbers of birds were being constrained by the size of the created habitat [REP7-016]. The Secretary of State welcomes this and considers that this addresses the concern of NE.

The Secretary of State is supportive of the Applicant's proposal for lagoon creation at Loch Ryan and, after considering the information provided during and after the Examination, she considers this to be a highly ecologically appropriate compensation measure with potential for significant benefits for sandwich tern. She is encouraged to see positive engagement between the Applicant and NE / RSPB during Examination, for example the agreement to pursue an island as opposed to a pontoon within the inland pool [REP2-017], and she welcomes the continuing development of the compensation proposals and consultation undertaken with all other relevant stakeholders, including the local authority, by the Applicant since the close of Examination[73].

The Secretary of State considers that detailed design and further adaptive management aspects are capable of being developed and resolved post-consent during preparation of the sandwich tern CIMP. The Secretary of State is responsible for approving the CIMP in consultation with NE as the SNCB and would expect to see the remaining matters resolved at that point, for example that any other necessary permits or licences had been obtained. The Secretary of State notes NE's advice that the measure cannot be considered fully secured until the land / rights have been acquired. The Secretary of State notes that subsequent permits and planning permission will be required to enable the Applicant to deliver the proposals and that these are not yet secured. Whilst this is not ideal, she does not agree with NE that this should prevent her from accepting the proposed measures at this time. Without prejudice to any subsequent and separate decisions made by other authorities, the Secretary of State sees no reasons or evidence at this time to suggest that subsequent planning permission and licences would not be granted, noting the positive engagement and progress made by the Applicant towards securing these. She also considers that the Letters of Support from the LPA and landowner of the progressed site provide an appropriate level of comfort at this stage that the land is available to the Applicant for the proposed purpose. She considers that sufficient information and assurance

[84] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010109/EN010109-002333-Royal%20Society%20for%20the%20Protection%20of%20Birds.pdf

has been provided at this stage to give her confidence that the proposed lagoon creation and colony restoration at Loch Ryan can be delivered to effectively compensate for the predicted impact on sandwich tern.

The Secretary of State acknowledges that NE remain concerned with a lead-in time of 2 full breeding seasons prior to turbine operation, however she also notes that NE has not suggested an alternative appropriate lead-in time. Whilst the Secretary of State agrees with NE and the Applicant that it is uncertain how quickly sandwich tern may colonise the site and the potential for a mortality debt to accrue, she considers that 2 years, as suggested by the Applicant, would provide a reasonable time for the site to establish following construction and that given the modest scale of predicted impact, any mortality debt that may accrue could be adequately compensated for over (or potentially beyond) the lifetime of the Project. Regarding ongoing monitoring and adaptive management, the Secretary of State agrees with NE that monitoring should commence once the measures are implemented and be for the length of time management is required, i.e. potentially beyond the Project's operational period, as per mortality debt requirements. If a mortality debt were to accrue whilst the Loch Ryan proposals were being developed and colonised, the Applicant agrees that this could, if required, be accounted for by extending the duration over which active management was undertaken at the Loch Ryan site to ensure that sufficient levels of breeding success are maintained over a sufficient number of years to balance the mortality predicted to have occurred during operation [REP7-016]. The Secretary of State welcomes the Applicant's agreement to this if required, and she is satisfied with the arrangements for monitoring and adaptive management to ensure the long-term success of the measures, noting the amendments made to the DCO as below. The Applicant also agrees [REP7-016] that one adaptive management measure could be to increase the size of the pool and number of islands if the evidence indicated that breeding numbers of birds were being constrained by the size of the created habitat. Any finding that the measure has been ineffective must be reported annually and, in such case, proposals to address this. Any proposals to address effectiveness must thereafter be implemented by the undertake as approved in writing by the Secretary of State in consultation with the SNCB. The Secretary of State is satisfied that practical measures for adaptive management are available as stated by the Applicant, for example in maintaining water quality and access routes for maintenance of the islands. She is content that further adaptive management measures can be identified post-consent during the detailed design of the measures. The sandwich tern CIMP must include details of the proposed ongoing monitoring and reporting on the effectiveness of the measures, including: survey methods; success criteria; adaptive management measures; timescales for the monitoring and monitoring reports to be delivered; and details of the factors used to trigger alternative compensation measures and/or adaptive management measures. It must also include provision for reporting to the Secretary of State, to include details of the use of the nesting habitat improvements by breeding sandwich tern to identify barriers to success and target any adaptive management measures. She considers that this addresses NEs concern that the scale of the proposals may not be sufficient to attract and sustain the required number of sandwich terns.

Blakeney Point – predator control

In the first consultation, the Secretary of State invited the Applicant to provide any further information on the alternative compensation measures required for adaptive management in relation to the site at Blakeney, specifically how the threat of rat predation could be overcome successfully, given the potential for rats to swim past any land barrier and the quantity of benefits arising from the measure as well as the effectiveness of any potential future measures.

The Applicant[73] reiterated that the Blakeney proposal is a supplementary measure to be delivered alongside the primary measure at Loch Ryan; an approach following the advice of NE, RSPB and National Trust. As noted in Section 7.6.3 of the sandwich tern CMD, there is a high degree of confidence that effective delivery of predator control would result in increased Sandwich tern breeding success, and hence an increased breeding population. The Applicant reiterates that, accounting for the site's characteristics, the proposed measures are intended to provide predator *control* rather than *eradication*. Given that Blakeney Point is not an island, complete eradication of mammalian predators would not be possible and therefore long-term implementation of predator control measures would be required throughout the lifetime of the operation of the Project, which will be subject to agreement with the National Trust and NE in relation to any activity at the Scolt Head colony. These works would be in addition to existing site management, which National Trust would continue to deliver. It is not considered that predator eradication will be required to achieve the required objectives of the measures, i.e. to increase the breeding success of the sandwich tern population at this location. Nonetheless, it is expected that the design of the trials and subsequent implementation will consider measures to reduce the movements of rats from outside of the colony (i.e. across sea or along Blakeney Point), reducing the threat of rat predation. Direct monitoring of rat populations would be undertaken. This is likely to include use of ongoing trapping data and other methods such as tracking tunnels/ pads, monitoring blocks and chew cards, and stomach content/ faeces analysis. Discussions with specialists will be required to understand the most appropriate methods, particularly to provide understanding of the movements of rats along Blakeney Point and across the Blakeney Channel from the mainland.

The Applicant refers to the information contained within the sandwich tern CMD regarding implementation and monitoring of the predator control measures. Given that the desk study and consultation with the expert panel are likely to identify the most suitable methods for controlling mammalian predators at the site; and that these methods will then be trialled to identify those which are most effective, it is not expected that adaptive management measures would be required. However, it is considered that, if required, adaptive management approaches could be implemented with respect to:

- The number, location and design of predator traps.
- The form and location of predator fencing.
- Measures to reduce overall suitability of Blakeney Point for rats (particularly in relation to winter survival).

The Applicant notes that it shared a detailed scope for the literature review aspect of these proposals with National Trust and NE on 24 November and 07 December 2023, respectively. This is the first step in the development of the measures which the Applicant has decided to progress pre-consent decision, in order that the trialling of potential control measures can be

brought forward as early as possible. The Applicant is seeking to commence implementation ahead of the 2024 breeding season. However, given timescales, it may not be possible to start until the following breeding season.

In terms of quantifying the benefits of the measure, a return of the sandwich tern colony to Blakeney Point following the successful implementation of predator control and management measures would be a key metric of success. Following this, ongoing monitoring of sandwich tern colony size and breeding success would provide an indication of the success of the measure. However, it should be recognised that providing accurate calculations for the benefits that would be accrued as a result of the proposal has not been requested by stakeholders and would not be possible given the number of variables (and their complex interconnectivity) associated with the sandwich tern colony in the NNC SPA. For example, the periodic colony switching between Blakeney Point and Scolt Head, the influence of HPAI and the complex interrelationship with black-headed gulls.

NEs advice remained unchanged[74] following the Applicants response to the first consultation letter; it reiterated its broad support for the inclusion of trialling of predator management measures. The RSPB[84] considered that the measure would comprise SPA site management measures rather than a supplementary compensation measure, and therefore should not be relied upon.

The Secretary of State notes that the ExA [ER 26.10.80] reports NE's advice that, based on the information submitted into Examination, the Loch Ryan proposal would not be suitable as a sole measure. However, she notes that NE [REP8-032] [REP8-103] also advise that the proposals for predator control measures at Blakeney Point (within the NNC SPA) do provide some resilience in the event of the primary measure being ineffective. NE agrees [REP8-032] with the Applicant that the initiative has merit in providing resilience to the sandwich tern compensation package as a supporting measure. The Secretary of State agrees with the Applicant and NE that the Blakeney Point predator control proposals provide some resilience in the unlikely event of the Loch Ryan proposals not proving effective immediately, although acknowledging the necessarily limited information provided at this stage. The Secretary of State notes that further study and development is required, but she does not agree with the ExA that this results in only limited reliance being placed on the proposals at Blakeney Point. She also notes that the Applicant commits to, and the DCO secures that the Blakeney measure must be delivered alongside the Loch Ryan measure and that it is not restricted to an adaptive management measure as suggested by the ExA. The Secretary of State welcomes the inclusion of this measure in the compensation package by the Applicant as a supplementary measure, which could help improve understanding and implement measures to address the recent and concerning failure of sandwich tern to breed at Blakeney Point. She agrees with NE and the Applicant regarding the benefits this could bring to sandwich tern of the NSN and is satisfied that an adequate, albeit necessarily limited, level of information has been provided on the Blakeney proposals at this time and that further development of the measure is amenable to progression post-consent and during preparation of the CIMP. The 'package of measures approach' does provide resilience, as the measures at Blakeney could deliver benefits to sandwich tern in a short timescale, local to the point of impact. She does, however, place more reliance on the Loch Ryan

measure at this time given the more advanced nature of the proposals. The Secretary of State agrees with NE regarding additionality; she considers that the measures are likely to be additional to the normal / standard measures required for the designation, protection and management of protected sites under the Habitats Regulations.

Amendments to the DCO and overall conclusion

The Secretary of State has amended Schedule 17 Part 1:

- paragraph 2 - to secure that the plan for the work of the STCSG must be submitted to and approved by the Secretary of State in consultation with all members of the STCSG, as suggested by NE;
- paragraph 4 subsection (4) (g) - to substitute reference to the 'use of the measures by breeding sandwich tern' with *'effectiveness of the measures in improving the success of breeding Sandwich tern to identify barriers to success and target any adaptive management measures*', as predator control measures at the NNC SPA (Blakeney) do not constitute a habitat measure that is directly 'utilised' by sandwich tern;
- paragraph 6 - to secure that no operation of any turbine forming part of the authorised development may begin until at least 2 years after the measures set out in the sandwich tern CIMP have been implemented;
- paragraph 8 - to secure that the results from the monitoring scheme must be submitted at least annually to the Secretary of State and the STCSG including the SNCB, as committed to by the Applicant; and
- paragraph 8 - to clarify that the decision as to whether the measures are proving ineffective and adaptive management measures are required is made by the Secretary of State.

Overall, having reviewed the information provided during the Examination, the additional information provided post-Examination and the responses of the consultees with regards to the package of compensation measures proposed for sandwich tern, the Secretary of State is satisfied that necessary compensatory measures can be secured and delivered to protect the coherence of UK NSN for sandwich tern as required by Regulations 29 and 36 of the Offshore Habitats Regulations and Regulations 64 and 68 of the Habitats Regulations. She considers that Schedule 17 Part 1 adequately secures the further work required to progress the proposed compensatory measure, including the approval of a CIMP.

9.4 Guillemot

The Applicant identified [REP8-038] a compensation requirement of 6 adult guillemot per annum against the 95% upper confidence limit prediction, assuming a displacement rate of 50% and mortality rate of 1%. NE reiterated that it does not support the use of a single rate for the purposes of impact assessment, advising that a range-based approach is taken [REP5-092] [REP8-032]. The Secretary of State acknowledges this, but considers that for compensation purposes, a quantum must be necessarily defined. For scaling compensation, NE consider that 16 guillemots per year is appropriate. The Secretary of State considers that central values of displacement and mortality for the assessment of displacement impacts on guillemot of 70% and 2% are, at the current time and based on current evidence, suitably precautionary for an

assessment to be made, but notes that this does not preclude her from accepting alternative parameters for future cases. She notes that these parameters predict 16 guillemot mortalities per annum, and she therefore agrees with NE that this is a suitable scale of compensation. The Secretary of State welcomes the Applicants commitment to compensate for the upper 95% CI.

To provide this level of compensation, the Applicant submitted without prejudice compensatory measures and documents for guillemot at the onset of the Examination. This included the provision of wording [REP8-008] to be inserted as Part 3 within Schedule 17 of the DCO. The final set of compensatory measures proposed are outlined in the Appendix 4 - Guillemot and Razorbill Compensation Document (Revision D) [REP7-020] (the guillemot CMD). An outline guillemot CIMP was submitted [REP5-018].

For guillemot, the Applicant proposes:

- bycatch reduction (project-led or in collaboration with other OWF developers); or
- predator eradication at a breeding colony (Channel Islands, in collaboration with other OWF developers).

Fishery bycatch reduction and Looming Eye Buoys (LEBs)

The Applicant presents its case in the guillemot CMD [REP7-020 section 10.2] that auks are caught in trawl and set net (gillnet) fisheries and therefore an appropriate compensatory measure could be reducing bycatch rates in English waters.

It states that Northridge et al. (2020) noted bycatch of 27 guillemots and three razorbills in 2,239 midwater trawls sampled in 1996-2018 and bycatch of 267 guillemots and 12 razorbills in 18,916 hauls of gillnets sampled over the same period. Their sampling extended slightly beyond the UK territorial limit (see Figure 1 in Northridge et al., 2020) but was predominantly within UK waters. The evidence therefore indicates bycatch of these species in UK waters to be most severe in set net fisheries.

Most bycatch of guillemots and razorbills was observed in southwest England and the English Channel (Figure 3 in Northridge et al., 2020) but there was also a ‘hotspot’ of bycatch off east England close to FFC SPA. At the DCO application stage, the Applicant had focused its proposals on the implementation of bycatch reduction measures in the northeast of England. However, since submission of the Application, the Applicant has had further discussions with fisheries stakeholders in the northeast of England and has ascertained that the level of gillnet fishing activity, and therefore auk bycatch, is unlikely to be of a sufficient scale to present a feasible compensation measure. The Applicant has therefore refocussed its proposals on the southwest of England where there is a much greater concentration of set-net fishing activity and therefore auk bycatch (Northridge et al., 2020).

Using the bycatch data in Northridge et al. (2020), scaled up to the entire fishery, Miles et al. (2020) estimated that bycatch of guillemots in UK set net fisheries in the UK Exclusive Economic Zone (a median estimate of 1,984 birds per year) may represent 1.7% of annual mortality of breeding adult guillemots (assuming that bycatch was equally distributed across all age classes in the population and only affected birds from the UK population rather than birds visiting UK waters from other countries). Set net fishing effort has reduced in recent years because of declines in salmon stocks to critically low levels. However, set nets are still being used to catch

sea trout, and those nets are likely to be responsible for a major part of the bycatch of guillemots and razorbills (Environment Agency, 2020).

It is proposed by the Applicant [REP7-020] that the reduction of seabird bycatch will be achieved through the use of above water deterrents (AWD) attached to fishing nets at regular intervals. There are multiple types of reduction techniques that can be used to reduce the interaction between diving seabirds and fishing equipment. Bycatch reduction techniques are designed to be suited to specific gear types and bycatch species. AWDs are usually fixed to buoys or markers attached to set fishing gear, which work to scare birds away from fishing nets. The Applicant considers [REP7-020] that LEBs are one of the most highly developed forms of AWD, which have been developed and trialled by BirdLife International in conjunction with Fishtek Marine Ltd. If compensation for auks is deemed to be required by the Secretary of State, the Applicant will pursue the implementation of bycatch reduction measures through the use of AWDs / LEBs.

Fishtek Marine Ltd on behalf of the Applicant produced an Annex 4B – Auk Bycatch Reduction Feasibility Statement [REP3-023]. This statement describes set-net fishing in the southwest of England, reviews recent evidence of bycatch in the southwest, describes Remote Electronic Monitoring (REM) systems, LEB technology and its potential to reduce bycatch, and the outline process and time-periods for securing vessel involvement in a REM scheme. It concludes that sufficient capacity exists in the southwest to enable the Project to deliver the required compensation. If required, the necessary number of fishers / vessels could be signed-up within a relatively short period (approximately one month) for involvement in baseline data collection and the onwards implementation of the REM systems and LEBs. Based on trials undertaken by HP4, it is suggested that implementation by these fishers / vessels of LEBs could reduce bycatch of auks by up to approximately 25%. The statement and the guillemot CMD report the trials undertaken by HP4 of LEBs, which the Applicant considers to support its case that LEBs are an ecologically effective measure. The Applicant calculates that to compensate for an annual mortality of 16 breeding adult individuals, 32 guillemots would require to be ‘saved’ from bycatch (as 46% of guillemots within UK Western Waters are juveniles / non-breeding, this is agreed with NE [RR-063]). Using the purported 25% reduction in guillemot bycatch as reported in the HP4 trials (Orsted 2022 [HP4: REP5-068]) and adopted by the Applicant [REP3-023]), the Applicant estimates [REP7-020 section 10.2.5] this would require 6 fishing vessels to implement LEBs / AWDs. It acknowledges that these calculations are indicative, and the number of vessels required will be agreed with the Guillemot Compensation Steering Group (GCSG) post-consent and would take account of any recent studies on baseline levels of auk bycatch and the effectiveness of LEBs / AWDs.

The Applicant states that the compensation will account one to one for losses of adult birds (noting that, in addition, birds from the immature age classes will also benefit from the bycatch reduction measures) to OWF impacts with no delay. It is proposed that the Applicant will enter into contract(s) with fishers / vessels for the provision and use of bycatch reduction technology (Annex 4B - Auk Bycatch Reduction Feasibility Statement [REP3-023] describes the process that would be undertaken to identify and sign-up fishers) no later than one year prior to the first operation of any wind turbine forming part of the authorised development. Monitoring is proposed to continue until the success of the compensation has been demonstrated but potentially throughout the operational lifespan of the Project. The requirement for adaptive management will be built into the annual programme of review with the GCSG.

The Applicant recognises [REP7-020] that both NE and the RSPB have raised a number of concerns regarding the approach taken and the evidence provided to date by HP4 and at this stage, have indicated that they do not consider bycatch reduction through implementation of LEBs to be a viable compensation measure. However, it remains the Applicant's position that of the options available to them, the proposed measure remains the most appropriate and proportionate approach to auk compensation that can be put forward on a Project-led basis and that there is sufficient evidence to suggest that bycatch reduction is a viable compensatory measure [REP7-020].

Predator eradication

As an alternative measure, the Applicant proposes to control predation on guillemots from a breeding colony where predation has an influence on the breeding success of the species. Eradication, the Applicant submits, is a well-established procedure that has brought huge gains to seabird conservation globally [REP7-020, Paragraphs 163-169].

The Applicant notes that HP4, which was required to compensate for its own impacts on auks, found that islands in the Bailiwick of Guernsey were therefore suitable for predator eradication as compensation.

Predator eradication from a breeding colony has not been developed by the Applicant as a project-led measure. However, as with bycatch reduction, the Applicant is aware that other developers have proposed and / or are in the process of implementing similar measures and it has therefore identified this measure as having the potential to be delivered (as either compensation or adaptive management) as part of a collaborative delivery model [REP7-020]. The measure may be delivered partly or wholly in place of bycatch reduction.

NE [REP3-146, point C30] raised doubt about the efficacy and effectiveness of this measure, particularly when HP4 would be developing such opportunities for their own compensation purposes. In response, the Applicant [REP5-049, Q3.14.1.8] stated that rat eradication at the Channel Islands would be on a collaborative basis and represents an alternative option that could be delivered wholly or partly in place of the other compensatory measures proposed (i.e. the bycatch reduction), and that such was the limited impact of the Project on guillemot, that collaborative opportunities alongside HP4 would be a feasible option. The Secretary of State notes that no agreement with HP4 to collaborate with it for the purposes of predator eradication was provided during Examination.

9.4.1 Advice of IPs

The Secretary of State notes that, given the similarities of the proposals and that the Applicant partly relies on submissions and evidence presented by the HP4 OWF to support the proposed compensatory measures for the Project, NE [RR-063, REP8-032] and the RSPB [REP1-161] reiterate their advice provided to the HP4 Examination regarding the unacceptability of bycatch reduction and predator eradication as compensatory measures. The advice of NE and the RSPB

regarding guillemot compensation for that case is summarised in the Secretary of State's HRA for that project[85].

NE [REP8-103] advises that whilst the principal measure has theoretical merit, it cannot be considered adequately secured due to outstanding uncertainties regarding feasibility, effectiveness, scale, and location. NE note that a target fishery has been identified as a potential auk bycatch hotspot, and there is some evidence to suggest that reducing direct mortality here might possibly form a basis for compensatory measures. Whilst delivering compensation via bycatch reduction is theoretically viable, NE consider that significant uncertainties remain which it considers to be extremely high risk.

NE highlights that the Applicant has reported on the first year of HP4 OWF's trial of LEB technology, however, it must reiterate that NE do not consider a single year of data collection to be sufficient to draw meaningful conclusions on LEB efficacy. HP4 calculated a relative 25% reduction in bycatch of guillemot by comparison of the percentage of LEB treated nets (42.9%) versus control nets (57.1%) that caught one or more guillemot. NE consider this calculation to be methodologically inappropriate and of no value in assessing the efficacy of the LEB. To put the value of this calculation into context, with no underlying data on actual bycatch being presented, NE could assume that the trial may have found 3 guillemots bycaught in treated nets compared to 4 in the control nets for a 25% reduction. NE can surmise this is not the case using the HP4 Applicant's calculations of the number of vessels that would be required to compensate their predicted impacts. However, the fact remains that the trial data is highly opaque and such a simple comparison of the treated and untreated nets pooled across the entire trial period is not informative and is potentially misleading. Furthermore, there is no assessment of statistical significance and therefore the reduction in bycatch as reported may even be coincidental or due to some other factor(s). NE consider it is hard to avoid reaching the conclusion that the data analysis appears to be fundamentally flawed. Accordingly, NE are concerned that the results are in no way comparable to the findings of peer-reviewed studies that utilise established bycatch data analysis techniques.

NE maintain that it is not possible to assess the potential scale of the measure without a proven implementation method with fully quantified and independently ratified success rates, and a quantified assessment of actual bycatch rates at the target fishery with consideration given to variation across vessels and other co-variates (e.g., gear specifics, environmental conditions). Calculation of the absolute bycatch reduction that might be possible will be required to understand the upper limits of compensation potential (maximum number of individuals that could be saved from direct mortality as bycatch). NE cannot currently advise on the potential for bycatch reduction to compensate for any given level of impact. It is also unclear whether the confidentially agreements that have (necessarily) hampered the Hornsea 4 OWF analysis would continue to be required once the measure was implemented, preventing the data from ever being publicly available even within the confines of a steering group. NE would not be able to support this approach both on the grounds of transparency and the inability to form meaningful success criteria and/or demonstrate with independent verification that the compensation was delivering. NE do remain fully supportive of the ongoing LEB trialling of measures to reduce auk bycatch

[85] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010098/EN010098-002331-DESNZ%20HRA%20-%20Hornsea%20Four_Final.pdf

and they are hopeful that some form of bird deterrent method or alternative mitigation measures will ultimately be capable of delivering quantifiable reductions in bycatch of auks and other marine birds. However, auk bycatch reduction is not currently demonstrated as being a viable compensation measure.

The RSPB [RR-083] [REP1-161] largely agrees with NEs advice and maintains its significant concerns regarding bycatch reduction using LEBs and predator eradication. In summary, the RSPB contends that LEBs are an experimental prototype measure that has been developed by the RSPB/ BirdLife International in collaboration with Fishtek Marine Ltd. It has not been proven to be an effective measure for bycatch reduction with respect of guillemot at the time of writing. The Applicant appears to place reliance on claims made by Orsted in its submissions to the HP4 Examination. The RSPB carefully reviewed the evidence presented by Orsted, was highly critical of it and considers that at this stage little weight can be placed on it as a viable compensation measure. The RSPB reiterates and maintains comments provided to the HP4 Examination on the inadequate reporting of results of HP4's trials of LEBs and flaws in the data analysis undertaken. Overall, the RSPB considers that the criteria for compensation measures in EC guidance[3] are not met and substantive issues relating to viability and feasibility of the measure are unresolved. Substantial evidence gaps remain. Unless these issues are resolved prior to consent, RSPB advice that it cannot be concluded that the coherence of the NSN will be protected.

9.4.2 ExA and the Secretary of State's conclusion

The ExA carefully considered all the evidence submitted to the Examination and considered that there may be merit in the Applicant's reliance upon bycatch reduction [ER 26.10.109 et seq.]. As conceded by NE [REP8-103] there is some evidence to suggest that reducing direct mortality via bycatch reduction might possibly form a basis for compensatory measures. The ExA considers that the Applicant has reported upon successful and promising trials demonstrating such a measure has the potential to be effective, and the ExA is convinced that pursuing such a measure could have the desired benefits. The ExA was aware that the Secretary of State previously found bycatch reduction, alongside technologies such as LEBs, to be a promising compensatory measure, endorsing such an approach for HP4. The ExA recognises the concerns of NE in this regard but states [ER 26.10.110] that it "must conclude that the method for the compensatory measure, though still somewhat immature in its proven effectiveness, would be appropriate in this instance.". The ExA agrees that the remoteness of the bycatch reduction to the FFC SPA means that it is unlikely the guillemot population at the FFC SPA would benefit. The ExA considered that the need to 'save' sufficient adult auks to ensure that the NSN is protected (rather than just the overall population of those species) is considered qualitatively in the Applicant's D7 submission [REP7-020] but is not factored into the scale of the measure in any quantified way. The ExA was however of the view that compensating for the loss of 16 guillemots per year represents a small-scale nature of impact, thus justifying the scale of compensation proposed in this instance.

Given the limited amount of information that came forward during the Examination, the ExA concur with NE's position [REP8-103] that the predator eradication measure is undeveloped. The ExA are concerned regarding the lack of clarity and detail on the proposals, and that there was no evidence before the Examination that HP4 would collaborate with the Applicant to allow contributions towards its own compensatory measures. In any event, such a measure is only

proposed as an alternative to the bycatch reduction, and not as a supplementary or secondary measure. This creates a single-strand approach to compensation, with a higher risk associated with it should this single measure not be successful. Therefore, based on the information submitted into the Examination, the ExA cannot conclude that the bycatch reduction measure, on its own and in knowledge that the methods are not to the satisfaction of NE, would be suitable as a sole compensatory measure. The ExA recommend that if the Secretary of State took an alternative view, she would need to be satisfied that the Applicant's proposals are sufficiently informed, developed and robust to be capable of protecting the coherence of the NSN as required by Regulations 64 and 68 of the Habitats Regulations. The ExA recommended [ER 26.10.134] that significant additional work is required to demonstrate that the compensatory measures for guillemot in the southwest of England would provide quantifiable and qualitative benefits to the nearest SPAs and the coherence of the NSN.

In the first consultation letter, the Secretary of State invited the Applicant to present further information to demonstrate that the compensatory measures for guillemot in the southwest of England would provide quantifiable and qualitative benefits to the nearest SPAs and the coherence of the NSN. Further information was invited on the alternative compensation measures required for adaptive management, specifically, further clarity and detail relating to the Applicants own predator eradication measures and evidence that HP4 would collaborate with the Applicant.

The Applicant[73] states that trials committed to in [REP8-052] to strengthen the evidence base will be seven fishing vessels, two of which have been funded by the Applicant. The study is being led by FishTek Marine Ltd who undertook preparatory activities for the study in summer 2023, including the signing up of vessels and their skippers, procuring of LEBs and installing the REM camera equipment on vessels. Data collection started in October 2023 and is due to be completed in October 2024. Following this a peer reviewed journal article will be prepared, which will be used to inform the Applicant's guillemot CIMP, if compensation is deemed to be required. The Applicant also provided an updated guillemot CMD (revision E)[86] which removes compensation proposals for razorbill and responds to the questions raised.

Regarding bycatch reduction, the Applicant notes that a compensation requirement of 452 guillemot per year was concluded, which is to be delivered by HP4's package of bycatch and predator eradication measures. Therefore, the Applicant recognises that the seven vessels proposed by HP4 [HP4: REP7-017] will likely need to increase. However, given the extent of set net fishing activity in the south and southwest of England (Annex 4B - Auk Bycatch Reduction Feasibility Statement [REP3-023]), there is considered to be sufficient capacity in the fleet in order to meet the Projects relatively small guillemot compensation requirement. The Applicant notes that the second-year trials undertaken by HP4 in winter 2022 / 2023 will provide further data on which to estimate potential reductions from implementation of LEBs. However, the Applicant is not aware that the information from these surveys is publicly available at the time of writing, although it is understood that data from HP4's bycatch studies will be made available to Fishtek Marine Ltd to inform the abovementioned study. The Applicant refers to previous

[86] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010109/EN010109-002269-5.5.4.2%20Appendix%204%20Guillemot%20Compensation%20Document%20Revision%20E%20Tracked.pdf

submissions and calculations which aimed to quantify benefits to birds of the NSN, and corrects minor errors identified in guillemot CMD revision D regarding the percentage of guillemot within UK Western Waters estimated to be breeding adults associated with the NSN. This now proposes that bycatch mortality would need to be reduced by approximately 37 birds if basing the compensation on NE's preferred displacement and mortality rates (i.e. 70% and 2%, respectively, which predict a mortality of 16 breeding adults from the NSN). This would require 8 vessels per year to implement LEBs (Table 11-2 of guillemot CMD revision E[73], assuming a 25% reduction in bycatch). The Applicant considers that it is not essential for compensation proposals to facilitate recruitment back into the NSN; however it has attempted to demonstrate (on a precautionary basis) the total level of bycatch reduction of guillemots that is estimated to be required, to compensate for the potential mortality of guillemots from within the NSN population as a result of the Project.

The Secretary of State considers that no substantial additional information in response to the first consultation letter was provided regarding the predator eradication proposal.

Having reviewed the Applicants response, NE maintains[74] that as no further detail is provided regarding the collaborative predator control measure, this is not assessed in detail by NE in its 'Updated Position on the Applicant's Proposed Compensatory Measures'. There has been no commitment from HP4 for collaboration with the Applicant. Given NE's advice that the proposals are highly unlikely to address the compensatory requirements for HP4[69], it cannot see how they could offer compensation for the Project either. NE states that its concerns regarding the compensatory measures highlight the requirement to ensure any implementation plan contains a clear commitment to adaptive management, which would if needed have to include different kinds of or locations of measures, and also for the plan to set targets that would trigger adaptive management should they not be met.

Regarding bycatch reduction, NE's advice remains unchanged[74] to that provided during Examination [REP8-032, REP8-103]. However, NE references recent results from the RSPB / Cornwall Inshore Fisheries Conservation Authority (CIFCA) trial of LEBs and predator-shaped kites between 2022 and 2023, which did not demonstrate that LEBs were effective at reducing bycatch of guillemot (Y. Rouxel, pers. comm), and a recent peer-reviewed publication from trials in Iceland equally did not show a significant bycatch reduction of guillemot species when using LEBs on fishing nets (Rouxel et al. 2023[87]). NE remain supportive of the ongoing trialling of measures to reduce auk bycatch and are hopeful that some form of bird deterrent method or alternative mitigation measures will ultimately be capable of delivering quantifiable reductions in bycatch of auks and other marine birds. However, it maintains that auk bycatch reduction is not currently demonstrated as being a viable compensation measure.

Having reviewed the Applicants response to the consultation letter and updated its advice[84], the RSPB continues to argue that the LEB is unproven as a measure that can successfully reduce bycatch in guillemot and therefore is wholly inappropriate as a compensation measure. Its detailed concerns are set out in [REP1-161]. These essentially repeat the RSPB's detailed criticisms of the HP4 published evidence base which the RPSB considered seriously flawed. The

[87] Rouxel Y, Arnardóttir H, Oppel S. 2023 Looming-eyes buoys fail to reduce seabird bycatch in the Icelandic lumpfish fishery: depth-based fishing restrictions are an alternative. R. Soc. Open Sci. 10: 230783. https://doi.org/10.1098/rsos.230783

RSPB's view of the scientific flaws in the published information on the HP4 bycatch trials remains as stated in [REP1-161] and elsewhere. Therefore, in the absence of scientifically peer-reviewed evidence from HP4 or the Applicant, the results seriously question any reliance being placed on LEBs as a compensation measure. The RSPB considers that no weight can or should be given to the Applicant's reliance on the HP4 bycatch proposals to support their own such proposals. The RSPB also references its recent trials with CIFCA. The results are not yet published, but the RSPB states they do not show evidence of LEBs having any statistically significant impact on seabirds' bycatch rate, including of guillemots (Y. Rouxel, pers. comm.). The RSPB remains of the view that there is no evidence in the public domain at this time, peer-reviewed or otherwise, that supports the use of the LEB as an effective measure to reduce bycatch in guillemots.

The Secretary of State 'must be confident that the measures will fully compensate for the negative effects of the proposal.'[4]. Further, 'measures for which there is no reasonable guarantee of success should not be considered, and the likely success of the compensation scheme should influence the final approval of the plan or project in line with the prevention principle. In addition, when it comes to deciding between different possibilities for compensation, the most effective options, with the greatest chances of success, must be chosen.'[3].

The Secretary of State considers that the Applicants responses to the concerns of NE and the RSPB (summarised in Table 11-1 of the guillemot CMD revision E) are reasonable, and that the Applicant reasonably describes and quantifies the scale of guillemot bycatch in the southwest, the compensation required and describing the path to implementation of trials and ultimately the LEBs. The Secretary of State also notes that NE supports ongoing LEB trials, agree its theoretical merit and acknowledge that further work may yield adequate information on efficacy in the post-consent period. The Secretary of State considers that the Applicants supporting evidence (Appendix 4 - Guillemot and Razorbill Compensation Document (Revision D) [REP7-020, revision E[86]], Annex 1C - Initial Review of Compensatory Measures for Gannet Guillemot and Razorbill [APP-067] and Annex 4B - Auk Bycatch Reduction Feasibility Statement [REP3-023]) demonstrates that this measure is technically feasible and deliverable and the Secretary of State considers the measures to have a reasonable prospect of success. The Secretary of State is content that the LEB measure is likely to be additional to the normal / standard measures required for the designation, protection and management of protected sites under the Habitats Regulations.

The Secretary of State does not agree with the ExA that the need to scale the compensation sufficiently to ensure that the NSN is protected rather than just the overall population of guillemot is not factored into the scale of the compensation requirement in any quantified way. Whilst noting NE's concerns, the Secretary of State considers that the Applicant presents a reasonable attempt at quantifying the required scale of compensation necessary to compensate for the loss of 16 adult guillemot of the NSN per year in the guillemot CMD. As above, the updated CMD revision E (section 11.2.5) corrects minor errors in calculations and now suggests that guillemot bycatch mortality will need to be reduced by approximately 37 guillemot per annum, to compensate for the loss of 16 adult guillemot of the NSN. The Applicant acknowledges, given that detailed knowledge on the distribution of birds from the different contributory breeding colony populations and different age classes within the BDMPS is lacking and the calculations assume

that these birds are uniformly distributed throughout the BDMPS (Furness 2015[88]), the calculations allow estimation of the by-catch reduction that is required to compensate for potential mortality at the level of the overall NSN but not at the level of the individual SPA populations that contribute to the UK Western Waters BDMPS. The Secretary of State agrees with the ExA that compensating for the loss of 16 adult guillemots of the FFC SPA per year represents a small-scale nature of impact thus justifying the scale of compensation proposed in this instance.

However, the Secretary of State acknowledges that LEBs are a novel measure and trials are ongoing, and therefore there is uncertainty and notes some of NE and the RSPBs reservations regarding the existing evidence base in support of the ecological efficacy of LEBs as a bycatch reduction measure. Specifically, she agrees that there is a need for further trials and robust, transparent statistical analysis of the results. The Secretary of State agrees with NE and the RSPB that a multi-year trial and subsequent robust statistical analysis of the data is required, given the experimental nature of the proposed LEB measure. She notes that the Applicant states[73] that further trials are ongoing, with results due in October 2024. She is supportive of the ongoing trialling of measures to reduce auk bycatch. Compensation ratios of 1:1 (as the Applicant currently proposes) or below should only be considered when it is shown that the measures will be fully effective in reinstating structure and functionality within a short period of time (e.g. without compromising the preservation of the habitats or the populations of key species likely to be affected by the plan or project nor their conservation objectives)[3]. As the Secretary of State shares some concerns of the ExA, NE and the RSPB that the effectiveness of the measure is still being fully proven and regarding the baseline level of bycatch of guillemot at the identified locations, she considers it appropriate that a ratio of compensation of at least 2:1 should be delivered. A lower ratio may be agreed post-consent if further information, such as the results of ongoing trials, provide additional comfort to the GCSG and Secretary of State. She welcomes the Applicants commitment that the number of vessels required to implement LEBs will be agreed with the GCSG post-consent and would take account of any recent studies on baseline levels of auk bycatch and the effectiveness of LEBs / AWDs.

The Secretary of State is responsible, in consultation with the SNCB (and all members of the GCSG, as amended below), for approving the guillemot CIMP post-consent. She would expect further robust evidence to be presented at that time to satisfy her that LEBs as an appropriate compensatory measure will be implemented at a sufficient scale to fully compensate for the predicted mortality of 16 breeding adults of the NSN per annum. In the event that further trials or evidence fail to prove, or disprove, the efficacy of LEBs, the Secretary of State would require the Applicant to propose and implement, as approved by the Secretary of State in consultation with the SNCB and GCSG, adaptive management measures. This could include the collaborative predator eradication proposals suggested by the Applicant, should, for example, further information be provided and agreement be reached with Hornsea Project 4 or other Project at that point, to provide the Secretary of State with the necessary comfort that this measure is appropriate. The Secretary of State agrees with NE that given the current uncertainty, it is necessary to ensure that any implementation plan contains a clear commitment to adaptive

[88] Furness, R. 2015. Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS). Natural England Commissioned Report 164: https://publications.naturalengland.org.uk/publication/6427568802627584

management, which would if needed have to include different kinds of, or locations of measures, and also for the plan to set targets that would trigger adaptive management should they not be met. The Secretary of State considers that the mechanism secured in Schedule 17 Part 3 adequately secures the further work required to progress the proposed compensatory measure, including the approval of a CIMP which must include further detail on the adaptive management measures and success criteria. For the avoidance of doubt, the Secretary of State would expect this information to be provided in the guillemot CIMP, as required by Schedule 17 Part 3 paragraph 24 (e), before being satisfied to approve the CIMP post-consent.

Amendments to the DCO and overall conclusion

The Secretary of State has amended Schedule 17 Part 3:

- paragraph 24 - to secure that the plan for the work of the GCSG must be submitted to and approved by the Secretary of State in consultation with all members of the GCSG;
- paragraph 25 - to secure that the Secretary of State must consult the SNCB and all members of the GCSG when deciding whether to approve the guillemot CIMP;
- paragraphs 26 and 27 - to remove erroneous references;
- paragraph 28 - to secure that no operation of any turbine forming part of the authorised development may commence until the guillemot CIMP has been approved by the Secretary of State and at least 1 year after the measures in the guillemot CIMP have been implemented;
- paragraph 28 - to secure that the results from the monitoring scheme must be submitted at least annually to the Secretary of State and the GCSG including the SNCB, as committed to by the Applicant; and
- paragraph 30 - to clarify that the decision as to whether the measures are proving ineffective and adaptive management measures are required to be implemented is made by the Secretary of State.

Overall, having reviewed the information provided during the Examination, the additional information provided post-Examination and the responses of the consultees with regards to the compensation measures proposed for guillemot, the Secretary of State is satisfied that the necessary compensatory measures can be secured and delivered to protect the coherence of UK NSN for guillemot as required by Regulations 29 and 36 of the Offshore Habitats Regulations and Regulations 64 and 68 of the Habitats Regulations.

10 HRA conclusion

The Secretary of State concludes that an AEoI of the FFC SPA, GW SPA and NNC SPA cannot be excluded due to collision impacts on the kittiwake and sandwich tern populations and displacement impacts on guillemot, resulting from the Project in combination with other projects. She has considered the derogation provisions to determine whether the Project can be consented.

The Secretary of State is satisfied that there are no feasible alternative solutions to fulfilling the objectives of the Project which would remove or reduce the risk of AEoI of the protected sites. The Secretary of State is also satisfied that there are clearly imperative reasons in the public interest for the Project to proceed, and that these reasons clearly outweigh the impacts to the protected sites.

The Secretary of State is satisfied that a package of compensatory measures to ensure that the overall coherence of the UK NSN is maintained can be secured and delivered with regards to kittiwake and guillemot of the FFC SPA and sandwich tern of the GW SPA and NNC SPA. The Secretary of state notes concerns of IPs and the ExA regarding the effectiveness of the proposed compensation measures for guillemot; however, she has reviewed the information provided by the Applicant and is confident that, along with the monitoring and adaptive measures that have been proposed, the measures have a reasonable chance of compensating for the effects of the Project. To provide further reassurance, the Secretary of State has amended conditions within the DCO, including to ensure that the measures must be commenced at least 1 year before operation of the turbines in the event that LEBs are implemented.

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