



The Planning Inspectorate
Yr Arolygiaeth Gynllunio

REPORT on the IMPLICATIONS for EUROPEAN SITES

Proposed Hornsea Project Four Offshore Wind Farm

An Examining Authority report prepared with the
support of the Environmental Services Team

Planning Inspectorate Reference: EN010098

28 July 2022

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1 INTRODUCTION

1.1 Background

- 1.1.1 Ørsted Hornsea Project Four Ltd (the Applicant) has applied to the Secretary of State for a Development Consent Order (DCO) under section 37 of the Planning Act 2008 (PA2008) for the proposed Hornsea Project Four Offshore Wind Farm (the application). The Secretary of State has appointed an Examining Authority (ExA) to conduct an Examination of the application, to report its findings and conclusions, and to make a recommendation to the Secretary of State as to the decision to be made on the application.
- 1.1.2 The relevant Secretary of State is the competent authority for the purposes of the Habitats Regulations¹ and the Offshore Marine Regulations² for applications submitted under the PA2008 regime. The findings and conclusions on nature conservation issues reported by the ExA will assist the Secretary of State in performing their duties under the Habitats Regulations and the Offshore Marine Regulations.
- 1.1.3 This report documents and signposts information provided within the DCO application, and the information submitted throughout the Examination by both the Applicant and Interested Parties (IPs), up to Deadline 5a (D5a)³ of the Examination (4 July 2022) in relation to potential effects to European Sites⁴. It is not a standalone document and should be read in conjunction with the Examination documents referred to. Where document references are presented in square brackets [] in the text of this report, that reference can be found in the Examination Library published on the National Infrastructure Planning website at the following link:
[Hornsea Project Four Offshore Wind Farm Examination Library](#)
- 1.1.4 It is issued to ensure that IPs including the Appropriate Nature Conservation Bodies, Natural England (NE) and Joint Nature Conservation Committee (JNCC) (in this case represented by NE), are consulted formally on Habitats Regulations matters. This process may be relied on by the Secretary of State for the purposes of Regulation 63(3) of the Habitats Regulations and Regulation 28(4) of the Offshore Marine Regulations. Following consultation, the responses will be considered by the ExA in making its recommendation to the Secretary of State and made available to the Secretary of State along with this report. The Report on the

¹ The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations).

² The Conservation of Offshore Marine Habitats and Species Regulations 2017 (the Offshore Marine Regulations) apply beyond UK territorial waters (12 nautical miles). These regulations are relevant when an application is submitted for an energy project in a renewable energy zone (except any part in relation to which the Scottish Ministers have functions).

³ Deadlines are further denoted in this report using the letter 'D' followed by the relevant deadline number.

⁴ The term European Sites in this context includes Sites of Community Importance (SCIs), Special Areas of Conservation (SACs) and candidate SACs, Special Protection Areas (SPAs), possible SACs, potential SPAs, Ramsar sites, proposed Ramsar sites, and any sites identified as compensatory measures for adverse effects on any of the above. For a full description of the designations to which the Habitats Regulations apply, and/or are applied as a matter of Government policy, see PINS Advice Note 10.

Implications for European Sites (RIES) will not be revised following consultation.

- 1.1.5 The Applicant's DCO application [Table 4 of REP5-012] concluded that there is the potential for likely significant effects (LSE) on 36 UK National Site Network European sites. The Applicant submitted information to inform an appropriate assessment of these sites with its application.
- 1.1.6 The Applicant's assessment also considered European sites in European Economic Area (EEA) States, and of these identified that potential impacts from the Proposed Development could lead to LSE on:
- Doggersbank SAC (Netherlands);
 - Klaverbank SAC (Netherlands);
 - Bancs des Flandres SAC (France);
 - Vlaamse Banken SAC (Belgium);
 - SBZ 1 SAC (Belgium);
 - SBZ 2 SAC (Belgium);
 - SBZ 3 SAC (Belgium);
 - Vlakte van de Raan SAC (Belgium /Netherlands);
 - Westerschede & Saeftinghe SAC (Netherlands);
 - Voordelta SAC (Netherlands);
 - Noordzeekustzone SAC (Netherlands); and
 - Waddenzee SAC (Netherlands).
- 1.1.7 Only European sites forming part of the UK National Site Network are addressed in this report.

1.2 Documents used to inform this RIES

- 1.2.1 The Applicant's Habitats Regulations Assessment (HRA) Report comprised the following documents:
- B2.2 Report to Inform Appropriate Assessment ('the RIAA') Part 1: [APP-167], amended by [AS-014] and updated in [REP1-010], [REP2-005] and [REP5-012];
 - B2.2 RIAA Part 2: Appendix A: Habitat Regulations Assessment Screening Report ('the HRA Screening Report') [APP-168], amended by [AS-015], and updated in [REP2-005];
 - B2.2: RIAA Part 3: Appendix B: Habitats Regulations Assessment Screening Matrices ('the HRA Screening Matrices') [APP-169, superseded by AS-012];

- B2.2: RIAA Part 4: Appendix C: Habitats Regulations Assessment Integrity Matrices ('the HRA Integrity Matrices') [APP-170], amended by [AS-016] and updated in [REP1-012];
 - B2.2 RIAA Part 5 [APP-171], Part 6 [APP-172], Part 7 [APP-173]: Summary of Designated Sites;
 - B2.2 RIAA Part 8: Appendix E: Related Guidance Documents [APP-174];
 - B2.2 RIAA Part 9: Appendix F: Maximum Design Scenario [APP-175];
 - B2.2 RIAA Part 10: Appendix G: Marine Mammals-Grey Seal RIAA information [APP-176];
 - B2.2 RIAA Part 11: Appendix H: Offshore Ornithology Flamborough and Filey Coast (FFC) Special Protection Areas (SPA) Population Viability Analysis [APP-177]; and
 - B2.2 RIAA Part 12: Appendix G: Marine Mammals-Bottlenose dolphin RIAA information [APP-178].
- 1.2.2 The Applicant also submitted a screening exercise for LSE in HRA terms in relation to sites selected by the Applicant as potential HRA compensatory measures [APP-179 and APP-180]. Any future consents for compensatory measures would be subject to separate HRA and are not discussed in this RIES, which addresses the HRA for the Hornsea Four Offshore Wind Farm DCO consent application.
- 1.2.3 In addition to these documents, the ExA has used representations submitted to the Examination by IPs, Issue Specific Hearing (ISH) documents, Statements of Common Ground (SoCG) and other Examination documents as relevant. All documents can be found in the Examination Library⁵.

1.3 Structure of this RIES

- 1.3.1 The remainder of this report is as follows:
- **Section 2** provides an overview of the European site(s) that have been considered within the DCO application and could be affected by the Proposed Development, along with a summary of key Examination matters up to 4 July 2022.
 - **Section 3** identifies the European site(s) and qualifying feature(s) screened by the Applicant for potential LSE, either alone or in combination with other projects and plans. The section also identifies

⁵ Examination Library accessible at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010098/EN010098-000837-Hornsea%20Project%20Four%20Offshore%20Wind%20Farm%20Examination%20Library.pdf>

the issues that have emerged during the Examination up to 4 July 2022.

- **Section 4** identifies the European site(s) and qualifying feature(s) that have been considered in terms of adverse effects on site integrity, either alone or in combination with other projects and plans. The section also identifies the issues that have emerged during the Examination, including where IPs have disputed the Applicant's conclusions, up to 4 July 2022.
- **Section 5** provides an overview of the Examination related to Imperative Reasons of Overriding Public Interest (IROPI) and Alternatives.
- **Section 6** provides an overview of the Examination related to compensatory measures.
- **Section 7** sets out concluding remarks on the purpose and intention of the RIES.

RIES questions

- 1.3.2 This RIES contains questions predominantly targeted at the Applicant and NE, which are drafted in *blue, underlined italic text*. The ExA would be grateful for responses from parties on these questions. However, it is stressed that responses to other matters discussed in the RIES are equally welcomed.
- 1.3.3 In responding to the questions in Tables 3.1 to 3.5 and Tables 4.1 to 4.3, please refer to the ID number in the first column.
- 1.3.4 Comments on the RIES are timetabled for D8 (18 August 2022 at noon).

2 OVERVIEW

2.1 European Sites Considered

- 2.1.1 The project is not connected with or necessary to the management for nature conservation of any of the European sites considered within the Applicant's assessment.
- 2.1.2 Section 5 of the HRA Screening Report [REP2-005] detailed the initial selection process undertaken by the Applicant to identify sites and features for consideration in the LSE screening assessment. The selection process was dependent on the nature of the qualifying feature considered.
- 2.1.3 The Applicant's HRA Report identified 40 European sites (and their qualifying features) for which the UK is responsible for inclusion within the assessment. These are listed in Table 3 of the HRA Screening Report [REP2-005].

Q.2.1.1. The ExA is not aware of any representations from IPs identifying any additional UK European sites for inclusion in the assessment, with the exception of the Tweed Estuary SAC (see ID 3.5.1 of Table 3.5 below). IPs are invited to comment.

Q.2.1.2. The ExA is also of the understanding that there is agreement regarding the citation information for the sites assessed. IPs are invited to comment.

2.2 Potential Impacts

- 2.2.1 The Applicant's HRA report groups the qualifying features of the identified European sites into the following receptor types:
- subtidal and intertidal benthic ecology;
 - marine mammals;
 - offshore and intertidal ornithology;
 - onshore ecology; and
 - migratory fish.
- 2.2.2 The potential impacts of the Proposed Development and the resulting effects assessed (LSE) depend on the receptor type, and the project stage (construction, operation, or decommissioning).
- 2.2.3 Table 5 of the HRA Screening Report [REP2-005] provides a detailed account of the potential impacts from the Proposed Development on the different receptor types, along with the potential geographical extent of effects. Tables 6 and 7 then relate this information to the European sites and their qualifying features assessed, with Section 7 supported by Table 1 of the HRA Screening Matrices [AS-012].
- 2.2.4 The Applicant considered that all potential impacts during the decommissioning phase would be similar to, and potentially less than, those outlined in the construction phase [Tables 5 and 6 of REP2-005].

- 2.2.5 In respect of onshore ecology, the Applicant considered likely significant impacts during the operation and maintenance phase would be similar to, but less than those outlined in the construction phase due to their smaller extent and shorter duration e.g., repairing a short section of cable [Table 7 of REP2-005].
- 2.2.6 The Applicant's RIAA [REP5-012] sets out both the assessment of effects from the project alone and project in-combination effects by the receptor types. It lists the European sites and qualifying features of relevance to that part of the assessment for which LSE were identified (summarised in Table 4 of the RIAA).
- 2.2.7 The information relating receptor types to potential impacts is summarised in Table 2.1 of this RIES. Not all potential impacts were considered by the Applicant for each qualifying feature, with reasoning provided in the Applicant's HRA Report. For simplicity, European sites are listed in Table 2.1 if any of the potential impacts were assessed for any of their qualifying features.

Q.2.2.1. The ExA is not aware of any representations from IPs identifying any additional impacts to be assessed. IPs are invited to comment.

Table 2.1: Impact-effect pathways considered by the Applicant's Assessment by Receptor Type

Receptor type	Potential impacts	Relevant European sites assessed (for LSE alone or in combination)
Subtidal and intertidal benthic ecology	Temporary habitat loss/ disturbance (all phases)	Flamborough Head SAC Humber Estuary SPA Humber Estuary SAC Humber Estuary Ramsar Moray Firth SAC The Wash and North Norfolk Coast SAC Berwickshire and North Northumberland Coast SAC
	Temporary increase in suspended sediment/ smothering (all phases)	
	Accidental pollution (all phases)	
	Invasive non-native species (all phases)	
	Increased nitrogen deposition ⁶ (construction and decommissioning)	
	Changes to physical processes (operation and maintenance)	
	Long-term physical loss of habitat (operation and maintenance)	
	Electromagnetic Fields (EMF) (operation and maintenance)	
Marine mammals	Increase in underwater noise (all phases)	Southern North Sea (SNS) SAC Moray Firth SAC The Wash and North Norfolk Coast SAC Humber Estuary SAC Humber Estuary Ramsar
	Vessel disturbance (all phases)	
	Vessel collision risk (all phases)	
	Changes in prey availability and behaviour (all phases)	
	Accidental pollution (all phases)	

⁶ Whilst the Applicant's assessment is focussed on qualifying features of European Sites, the Applicant also identified a potential LSE on saltmarsh, as a supporting habitat of designated features of the Humber Estuary SPA, due to increased nitrogen deposition during construction. Conversely, the Applicant provided rationale for not screening for potential effects on habitats supporting designated features of the Greater Wash SPA in Section 8.1.2 of [APP-167]; this being due to factors including lack of connectivity, distance between works and that SPA, and the scale and extent of works along the cable corridor.

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Receptor type	Potential impacts	Relevant European sites assessed (for LSE alone or in combination)
	Temporary increase in suspended sediment/ smothering (construction and decommissioning)	Berwickshire and North Northumberland Coast SAC
	Long-term physical loss of habitat (operation and maintenance)	
Offshore and intertidal ornithology	Direct disturbance and displacement (all phases)	Greater Wash SPA
	Changes in prey availability and behaviour (all phases)	Flamborough and Filey Coast (FFC) SPA
	Risk of collision (operation and maintenance)	Coquet Island SPA
	Barrier effect (operation and maintenance)	Farne Islands SPA Hornsea Mere SPA Humber Estuary SPA Humber Estuary Ramsar Northumbria Coast SPA Teesmouth and Cleveland Coast SPA Northumberland Marine SPA St Abb's Head to Fast Castle SPA Forth Islands SPA Outer Firth of Forth and St Andrew's Complex SPA Fowlsheugh SPA Buchan Ness to Collieston Coast SPA Troup, Pennan and Lion's Heads SPA East Caithness Cliffs SPA North Caithness Cliffs SPA Copinsay SPA Hoy SPA Marwick Head SPA

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Receptor type	Potential impacts	Relevant European sites assessed (for LSE alone or in combination)
		Rousay SPA Calf of Eday SPA West Westray SPA Fair Isle SPA Sumburgh Head SPA Noss SPA Fetlar SPA Hermaness, Saxa Vord and Valla Field SPA Lindisfarne SPA Lindisfarne Ramsar Tips of Corsemaul and Tom Mor SPA
Onshore Ecology	Temporary habitat loss (all phases)	Humber Estuary SPA Humber Estuary Ramsar
	Temporary disturbance/ damage to habitats (all phases)	
	Habitat fragmentation or severance (all phases)	
	Visual disturbance to species (all phases)	
	Noise disturbance to species (all phases)	
	Invasive non-native species (all phases)	
	Accidental release of contaminants (all phases)	
Migratory fish	Temporary increase in suspended sediment/ smothering (all phases)	River Derwent SAC Humber Estuary SAC Humber Estuary Ramsar
	Increase in underwater noise (all phases)	
	Temporary habitat loss/ disturbance (all phases)	
	Accidental pollution (all phases)	

Receptor type	Potential impacts	Relevant European sites assessed (for LSE alone or in combination)
	Invasive non-native species (operation and maintenance)	
	Changes to physical processes (operation and maintenance)	

2.3 Summary of the Applicant's Assessment

- 2.3.1 The Applicant's screening conclusions are presented in Section 8 of the RIAA [REP5-012]. Table 4 of the RIAA summarises the sites and features for which LSE from the Proposed Development alone were identified. The detail behind this summary is presented with the HRA Screening Matrices [AS-012] and HRA Screening Report [REP2-005].
- 2.3.2 These sites were assessed by the Applicant to determine if they could be subject to an adverse effect on integrity (AEoI) as a result of the Proposed Development alone or in combination with other plans and projects, in view of their conservation objectives. The Applicant's assessment is presented in [REP5-012].
- 2.3.3 The application version of the RIAA [APP-167] concluded that the Proposed Development would not result in an AEoI to any European site. Despite this conclusion, the application documents contained derogation information [APP-182] and compensation proposals [APP-179] for the kittiwake, gannet, guillemot and razorbill interest features of the FFC SPA on a 'without prejudice' basis [APP-179 to APP-202]. The Applicant stated that this was submitted because the Secretary of State's Hornsea Three Offshore Wind Farm decision had clarified that there is a need to consider derogation during the Examination where there is the potential for AEoI [e-page 14 of APP-182] and NE had indicated during pre-application consultation that it could not agree to no AEoI on a number of sites [Table 1 of APP-167].
- 2.3.4 During the Pre-Examination phase, the Applicant submitted a position paper concluding that there would be an AEoI on FFC SPA due to collision risk to kittiwake in combination with other plans or projects during operation [AS-023]. This conclusion was reflected in the updated RIAA [REP5-012]. The Applicant updated its derogation information and compensatory measures proposed during the Examination to date. See Sections 5 and 6 of this RIES for further details.
- 2.3.5 The Applicant's updated RIAA [REP5-012] concluded that the Proposed Development would not result in AEoI to all of the other European sites listed in Table 2.1. The conclusions of the Applicant's assessment of no AEoI are not agreed with the Appropriate Nature Conservation Body (ANCB), NE, both in relation to the other qualifying features of FFC SPA or in relation to a number of other European sites at the time of reporting (see Section 4 of this RIES).
- 2.3.6 As noted above, the Applicant also submitted derogation and compensation information in relation to the gannet, razorbill, and guillemot qualifying features of FFC SPA (see Section 6 of this RIES). The compensatory measures have been submitted by the Applicant on a without prejudice basis. This report does not include a detailed discussion of matters relating to the derogations or to compensatory measures but provides an overview for context related to the consideration of LSE and of AEoI.

2.4 HRA Matters Considered During the Examination

2.4.1 The Examination to date has focussed on the following matters:

- subtidal and intertidal benthic ecology:
 - indirect effects from impacts on Smithic Bank; and
 - changes to the hydrodynamic regime as a result of impacts on the Flamborough Front⁷;
- marine mammals:
 - the need for further noise mitigation;
 - the Applicant's approach to the in-combination assessment;
 - the use of Site Integrity Plan (SIP) to address in-combination underwater noise;
 - indirect effects on prey availability from impacts on Flamborough Front; and
 - collision risk whilst vessels are in transit to and from ports;
- offshore and intertidal ornithology:
 - robustness of baseline characterisation;
 - the Applicant's assessment methodology for collision risk, disturbance, displacement and barrier effects;
 - apportionment of baseline bird numbers to the FFC SPA; and
 - indirect effects on prey availability from impacts on Flamborough Front.

⁷ Section 3.3 provides the Applicant's description of this persistent tidal mixing front system.

3 LIKELY SIGNIFICANT EFFECTS

3.1 Applicant's approach

- 3.1.1 A total of 40 European sites for which the UK is responsible were screened by the Applicant prior to the Examination.
- 3.1.2 The Applicant described how it determined what would constitute a 'significant effect' in Section 6 of its HRA Screening report [REP2-005]; Table 6 demonstrates the assessment and conclusions with regards to potential LSE for offshore receptor types, and Table 7 demonstrates the assessment and conclusions for onshore sites.
- 3.1.3 The outcomes of the Applicant's screening exercise are summarised in Section 8 of the RIAA [REP5-012].
- 3.1.4 The Applicant has addressed potential in-combination effects in Section 7 of its HRA Screening report [REP2-005]. The projects included in the in-combination assessment carried out by the Applicant are presented in Section 7 of [REP2-005] for each of the receptor types identified in Section 2.2.1 of this RIES.
- 3.1.5 The Applicant applied a 'tiered' approach to the assessment in order to reflect uncertainties around the other projects assessed. All impact-effect pathways identified were considered for their potential contribution to in-combination effects, regardless of whether potential LSE from the Proposed Development alone was identified at the screening stage.
- 3.1.6 The other projects included in the in-combination assessment have been agreed with NE [e-page 47 of RR-029] and no comments to the contrary have been submitted from any other IPs. Following comments from NE [RR-029], the Applicant committed to updating the assessment pertaining to the Endurance Carbon Capture Storage project, when more detailed information on this proposal became available [REP3-046]. The Applicant updated the scope of the in-combination assessment for the assessment as a whole at D5 in the updated RIAA [REP5-012] to acknowledge the submission of an EIA scoping request for the Endurance Carbon Capture and Storage project, confirming no change to the information used in the in-combination assessment for Hornsea Four and to the conclusions drawn.
- 3.1.7 In respect of the in-combination assessment of effects on marine mammals, NE sought clarification on the tier structure applied to the projects considered and advised seismic surveys and unexploded ordnance (UXO) clearance activities be included. It also raised concerns over the reliance on the Site Integrity Plan process to manage in-combination impacts [RR-029]. These matters are detailed in Table 4.2 of this RIES.

3.2 Sites for which the Applicant concluded no LSE on all qualifying features

3.2.1 The Applicant concluded that the Proposed Development would not be likely to give rise to significant effects, either alone or in combination with other projects or plans, on all qualifying features of:

- The River Derwent SAC [Matrix 5 of AS-012];
- Lindisfarne SPA;
- Lindisfarne Ramsar; and
- Tips of Corsemaul and Tom Mar SPA.

Q.3.2.1. The ExA understands that the Applicant's conclusions of no LSE with respect to the sites above were not disputed by any IPs during the examination. IPs are invited to comment.

Q.3.2.2. IPs are invited to comment if there are any other UK European sites for which LSE can be excluded for all qualifying features.

3.3 Sites for which the Applicant concluded LSE on some or all qualifying features

3.3.1 The Applicant further concluded that the Proposed Development would be likely to give rise to significant effects, either alone or in combination with other projects or plans, on one or more of the qualifying features of the remaining 36 European sites assessed.

3.3.2 The Applicant's conclusions of potential LSEs were not disputed by any IPs during the Examination. However, some LSEs were excluded for specific impact pathways or qualifying features of these sites within the subtidal and intertidal benthic ecology, marine mammal or offshore and intertidal ornithology receptor types. Concerns raised in this regard by IPs, or identified by the ExA, are summarised in Tables 3.1 to 3.3 below and relate to the following European sites:

- Flamborough Head SAC;
- Humber Estuary SAC;
- Humber Estuary Ramsar;
- Humber Estuary SPA;
- SNS SAC;
- The Wash and North Norfolk SAC;
- FFC SPA;
- Farne Islands SPA;
- Greater Wash SPA;
- Lindisfarne SPA;

- Lindisfarne Ramsar; and
 - Tips of Corsemaul and Tom Mor SPA.
- 3.3.3 Reasoning is provided for the Applicant's conclusions in relation to these sites in the Applicant's HRA report, however, some clarification is sought by the ExA (see Tables 3.1 to 3.3 below) in respect of these conclusions.
- 3.3.4 The Applicant's assessment screened out all LSE on all qualifying features assessed under the receptor types of onshore ecology and migratory fish. Examination matters relating to these outcomes are highlighted in Tables 3.4 to 3.5 below and relate to the following European sites:
- Humber Estuary SPA;
 - Humber Estuary Ramsar;
 - Humber Estuary SAC;
 - Tweed Estuary SAC.

Impacts on Flamborough Front

- 3.3.5 The potential impact of the Proposed Development on the Flamborough Front and any resultant effects on European Sites were of particular relevance to the screening for LSEs. To avoid duplication in Tables 3.1 to 3.3 below, an introduction to this matter is provided below.
- 3.3.6 The RIAA [REP5-012] described Flamborough Front as, *"an area of sea characterised by a distinct temperature gradient between the waters north and south of the Flamborough headland ... This front results in increased nutrient rich waters during summer and to a lesser extent in Autumn months, which creates ideal foraging habitat for a number of seabird species. The Flamborough Front can be defined within a shifting band of water to differing distances from an indicative line... there is no direct overlap or connectivity between the Flamborough Front and the Hornsea Four array area"*.
- 3.3.7 The Environmental Statement (ES) [paragraph 1.11.2.31 of APP-013] suggests that the influence of turbulent flow wakes from the presence of foundation structures is likely to remain spatially distant from the Flamborough Front. However, NE [e-pages 20 and 70 of RR-029] considered that foundation structures in the array area could generate turbulent wakes that could impact on large-scale stratification of the North Sea off the coast of Flamborough Head. It had particular concerns regarding the inclusion of Gravity Base Structures (GBS), which are of sizes not previously deployed in English waters and could significantly increase the potential for turbulence effects; this concern was shared by the Marine Management Organisation (MMO) [REP3-052]. Given the Front's influence on the wider ecology of the area, NE highlighted the potential for effects on Flamborough Head SAC, FFC SPA, Humber Estuary SAC/ SPA/ Ramsar and SNS SAC. Specific details are provided in Tables 3.1, 3.2 and 3.3 below.
- 3.3.8 NE [e-page 70 of RR-029] and the MMO [REP3-052] also queried the location of the Flamborough Front relative to the Proposed Development.

- 3.3.9 In document 'G4.9 Marine Processes Supplementary Report' [REP4-043], the Applicant explained that the location of the front varies seasonally and annually and acknowledged that it had overlapped with the proposed Hornsea Four array area in previous years [e-page 47]. Nevertheless, the Applicant continued to conclude it unlikely that any increased turbulence from the presence of the foundation structures would extend to the Flamborough Front [e-page 53]. It stated [e-pages 56 and 59] that "*the high buoyancy forces associated with the stratification would not be destabilised by the local and relatively small turbulent wakes generated in the near-field of each foundation*".
- 3.3.10 In response, NE, the MMO and Cefas [REP5-107 and Summary tab, cell D38 of REP5-112] highlighted recent research showing the potential for large-scale hydrodynamic changes due to clusters of wind farms in seasonally stratified seas and noted that the GBS for the Proposed Development could have significantly larger dimensions than those studied in this research. They also raised concerns that cold water plumes could form in the lee of the foundation structures and alter sea temperature, which could impact on primary production and the wider marine ecosystem. The agencies stated that the Flamborough Front is a 'biodiversity hotspot' and thus the potential for changes resulting from the Proposed Development could have long-term effects on marine primary production and the wider marine ecosystem. They advised that further consideration be given to potential impacts in the context of the HRA.
- 3.3.11 NE, the MMO and Cefas⁸ [REP5-114] acknowledged that the nature and extent of these changes are difficult to quantify and assess, and therefore advised that risks be reduced as far as possible by reducing the maximum design scenario for foundation structures within the array as much as possible or removing GBS as an option (i.e., using monopiles in place of the larger GBSs).
- 3.3.12 The Applicant responded in [REP5a-017]. Table 3 detailed existing project commitments, and Tables 4 and 5 responded to the mitigation and monitoring suggested by NE, the MMO and Cefas in [REP5-114]; this included a commitment to reducing the number of GBS foundation structures from 110 to 80. However, it did not agree that further consideration in the context of HRA was required as all mitigation proposed reduces impacts and that no new impacts arise that invalidate the HRA submitted with the application.
- 3.3.13 The ExA considers this matter to be unresolved at the point of publication of the RIES.

⁸ The Centre for Environment, Fisheries and Aquaculture Science

Table 3.1: Issues raised by the ExA and IPs in relation to the Applicant's screening of LSEs (alone and in combination) in relation to effects on subtidal and intertidal benthic ecology

Table 3.1: Subtidal and intertidal benthic ecology				
ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
3.1.1.	Flamborough Head SAC Humber Estuary SAC and Ramsar	<p><u>Changes to physical processes during construction and decommissioning</u></p> <p>The Applicant screened in a LSE for changes to physical processes to the reef qualifying feature of the Flamborough Head SAC during operation [Matrix 2 of AS-012]. NE [e-page 130 of RR-029] advised that changes to physical processes should also be screened in for construction and decommissioning.</p> <p>The Applicant screened out changes in physical processes during operation to the Humber Estuary SAC and Ramsar and did not assess impacts for the construction or</p>	<p>The Applicant [e-page 420 of REP1-038] referred to the ES [APP-013], which concluded that sediment deposition during construction within Flamborough Head SAC is not a likely occurrence. However, Table 6 of the HRA Screening Report [REP2-005] screened in a LSE from temporary increases in suspended sediments/ smothering for reefs and submerged or partially submerged sea caves on a precautionary basis.</p> <p>The Applicant [e-page 420 of REP1-038] considered that, "there is no basis for any changes in hydrodynamics to extend to the Humber Estuary SAC/SPA/Ramsar nor any physical processes pathway that would reach the Humber Estuary designated sites" and referred to Table 6 of the HRA Screening Report [REP2-005].</p> <p>It provided further justification that there would be no changes to sedimentary processes along the Holderness coast caused by cable installation in document 'G4.9 Marine Processes Supplementary Report' [REP4-043].</p>	<p>Questions to NE:</p> <p><i>(i) In respect of Flamborough Head SAC, NE is requested to provide reasoning for its request to screen in a LSE from changes to physical processes during construction and decommissioning and confirm which qualifying features it considers LSE relate to.</i></p> <p><i>(ii) Can NE explain why it considers there to be a LSE to Humber Estuary SAC and Ramsar?</i></p>

Table 3.1: Subtidal and intertidal benthic ecology				
ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
		decommissioning phase [Matrix 6c of AS-012]. NE advised that impacts from changes to physical processes be screened in for all phases for Humber Estuary SAC and Ramsar.		
3.1.2.	Flamborough Head SAC	<p><u>Changes to hydrodynamic regime (as a result of impacts to Flamborough Front) during operation</u></p> <p>In respect of physical processes, the Applicant stated that the only element of the Proposed Development close enough to Flamborough Head SAC to affect coastal processes is the export cable [Matrix 2 of AS-012 and REP2-005].</p> <p>However, NE advised [e-page 130 of RR-029] that impacts to Flamborough Head SAC from changes to</p>	<p>See paragraphs 3.3.5 to 3.3.13 of this RIES for further details regarding Flamborough Front.</p> <p>The Applicant did not respond to this specific matter in its response to Relevant Representations [e-page 420 of REP1-038].</p>	<p>The ExA understands that NE's concerns regarding impacts on Flamborough Front relate to effects on primary production.</p> <p><u>Question to NE:</u></p> <p><u>NE is requested to explain the basis upon which it considers a LSE to the habitat qualifying features of Flamborough Head SAC should be screened in.</u></p>

Table 3.1: Subtidal and intertidal benthic ecology				
ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
		the hydrodynamic regime (as a result of potential impacts to Flamborough Front) should be screened in.		
3.1.3.	Humber Estuary SAC, SPA and Ramsar site	<p><u>Physical processes – indirect effects as a result of impacts to the Smithic Bank</u></p> <p>The Applicant ruled out a LSE to all features of the Humber Estuary SAC, SPA and Ramsar site from changes to physical processes.</p> <p>However, NE [e-pages 20, 132 and 133 of RR-029] raised concerns that Humber Estuary SAC, SPA and Ramsar site could be indirectly affected by impacts on Smithic Bank.</p> <p>(See paragraphs 4.3.6 to 4.3.15 of this RIES for further details regarding Smithic Bank).</p>	The Applicant [e-page 420 of REP1-038] considered that, <i>"there is no basis for any changes in hydrodynamics to extend to the Humber Estuary SAC/SPA/Ramsar nor any physical processes pathway that would reach the Humber Estuary designated sites"</i> and referred to Table 6 of the HRA Screening Report [REP2-005].	<p><u>Question to NE:</u></p> <p><u>NE is requested to explain the basis upon which it considers there to be a LSE on the Humber Estuary SAC, SPA and Ramsar site from impacts on Smithic Bank and to confirm the qualifying features for which it considers there are LSE.</u></p> <p>(Please see also ID 3.2.5 of Table 3.2 and ID 3.3.9 of Table 3.3).</p>

Table 3.1: Subtidal and intertidal benthic ecology

ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
3.1.4.	Flamborough Head SAC Humber Estuary SAC, SPA and Ramsar	Physical processes – impacts <u>from the temporary access ramp in the intertidal area</u> NE [e-pages 18 and 132 of RR-029] raised concerns that impacts from the temporary access ramp proposed to be located in the intertidal area during construction had not been assessed.	The Applicant [e-page 169 of REP1-038] [response to DCO.2.2 in REP5-074] confirmed that the ramp would be located above Mean High Water (MHW) and would only partially encroach the very upper intertidal area, in order to facilitate access to the beach for an emergency response to a potential bentonite breakout; therefore, interactions with the sea would be limited and during the highest tides. It concluded [response to the ExA's written questions and requests for information (ExQ1) MC.1.19 at e-page 168 of REP2-038] there would be no measurable impacts to designated sites such as Flamborough Head SAC, and the Humber Estuary SAC, SPA and Ramsar. NE subsequently agreed that the ramp would be unlikely to interfere with beach processes, but it had concerns regarding cliff erosion. The matter was shown as unresolved in NE's D5 issue log [Tab E, cell K21 of REP5-112].	The ExA understands that NE's concerns relate to cliff erosion and not to impacts on European sites. <u>Question to NE:</u> <i><u>NE is requested to confirm if the ExA's understanding is correct and whether it agrees a LSE from changes to physical processes from the temporary access ramp can be excluded for Flamborough Head SAC and the Humber Estuary SAC, SPA and Ramsar.</u></i> (Please see also ID 3.3.10 of Table 3.3).

Table 3.2: Issues raised by the ExA and IPs in relation to the Applicant's screening of LSEs (alone and in combination) in relation to marine mammals

Table 3.2: Marine mammals				
ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
3.2.1.	SNS SAC	<p><u>Changes to sediment transport regime</u></p> <p>The Applicant screened out a LSE from increased suspended solids, but did not assess changes to physical processes on the SNS SAC [Matrix 1 of AS-012].</p> <p>NE stated [e-page 130 of RR-029] that impacts on SNS SAC from changes to the sediment transport regime should be screened in.</p>	The ExA has not found a response from the Applicant regarding the need to screen in potential effects on the SNS SAC from changes in the sediment transport regime.	<p><u>Question to the Applicant and NE:</u></p> <p><i><u>The Applicant and NE are requested to confirm and justify their positions in relation to effects on the SNS SAC from changes to the sediment transport regime. Can NE confirm which phase(s) of the development its concerns relate to.</u></i></p>
3.2.2.	SNS SAC Humber Estuary SAC and Ramsar	<p><u>Changes to hydrodynamic regime (as a result of impacts to Flamborough Front) during operation</u></p> <p>The Applicant did not assess impacts of changes to physical processes (including the hydrodynamic regime) on</p>	See paragraphs 3.3.5 to 3.3.13 of this RIES for further details regarding Flamborough Front.	The ExA understands that NE's primary concern relates to the potential for impacts on the Flamborough Front to affect prey availability for the marine mammal qualifying species of SNS SAC and Humber Estuary

Table 3.2: Marine mammals				
ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
		<p>SNS SAC [Matrix 1 of AS-012]. However, it ruled out the potential for an LSE to grey seal of the Humber Estuary SAC from changes to physical processes (Matrix 6a of AS-012].</p> <p>NE advised [e-page 130 of RR-029] that impacts to SNS SAC and Humber Estuary SAC from changes to the hydrodynamic regime (as a result of potential impacts to Flamborough Front) should be screened in.</p>		<p>SAC; this matter is addressed at ID 3.2.3 below.</p> <p><u>Question to NE</u></p> <p><u>NE is invited to comment on whether it has any additional concerns regarding impacts on the harbour porpoise of the SNS SAC or grey seal of the Humber Estuary SAC as a result of changes to the hydrodynamic regime.</u></p> <p>(Please see also ID 3.3.2 of Table 3.3).</p>
3.2.3.	SNS SAC Humber Estuary SAC	<p><u>Changes to physical processes - indirect effects on prey availability</u></p> <p>The Applicant screened out LSE to harbour porpoise of the SNS SAC and grey seal of the Humber Estuary SAC as a result of changes in prey</p>	<p>As detailed above in paragraphs 3.3.5 to 3.3.13 of this RIES, the Applicant concluded that there would be no impacts to Flamborough Front.</p> <p>The Applicant submitted document 'G5.10 Professor Mike Elliot's Marine Processes Report Review' [REP5-066] which stated that the contents of nutrients in the area would not change,</p>	<p><u>Question to the Applicant and NE:</u></p> <p><u>Do the Applicant and NE consider that there is potential for a LSE on harbour porpoise of the SNS SAC and grey seal of the Humber Estuary SAC</u></p>

Table 3.2: Marine mammals				
ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
		<p>availability and behaviour [Matrices 1 and 6a of AS-012] given the large foraging range of these species and the short-term duration and temporary nature of any impact.</p> <p>However, as noted in paragraphs 3.3.5 to 3.3.13 of this report, NE [e-pages 20 and 70 of RR-029] raised concerns of impacts on the productivity of Flamborough Front and thus prey for marine mammals.</p>	therefore it is not easy to see how the primary production would change.	<i><u>as a result of indirect effects on prey availability due to impacts on the Flamborough Front?</u></i>
3.2.4.	SNS SAC	<p><u>Piling noise - indirect effects on prey availability (herring) from piling noise</u></p> <p>The Applicant proposed a piling restriction at the HVAC booster station in the export cable corridor (ECC) during the 'peak' herring spawning season, which it considered to</p>	The Applicant submitted document 'G1.10 Clarification Note on Peak Herring Spawning Period and Seasonal Piling Restriction' [REP1-039] to provide further details on how the peak spawning period has been calculated; it concluded that its proposed piling restriction was sufficient. Document G1.10 was revised at D2 [REP2-033] to address further concerns of the MMO [REP1-076].	NE has not specifically identified this as a matter of concern in relation to European sites but has raised concerns of impacts on protected birds and marine mammals.

Table 3.2: Marine mammals

ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
		<p>be 1st September – 16th October.</p> <p>The MMO [RR-020][REP1-076] and NE [e-page 162 of RR-029] considered that the 'peak' had not been justified and the restriction should cover the whole spawning season. NE had concerns that the impacts of piling on herring would result in less food for protected bird and marine mammal species off Flamborough and within the North Sea [Tab G, cell H4 of REP5-112].</p>	<p>Nevertheless, the MMO [REP4-052] considered that the seasonal piling restriction proposed by the Applicant does not allow for any period of time prior to the 'peak' of spawning for herring to migrate to the spawning grounds before spawning takes place. It therefore requested underwater noise modelling to help provide confidence in determining an appropriate restriction period. The Applicant responded [e-pages 9 to 13 of REP5-081] and the MMO [REP5a-027] stated that it would respond at D6.</p> <p>NE continued to advocate that more precaution is required with the peak herring spawning calculations; the matter was shown as unresolved in NE's D5 issue log [Tab G, cell L4 of REP5-112].</p>	<p>Question to NE:</p> <p><u>Please can NE confirm whether it considers the impacts of piling on herring and indirect effects on birds and marine mammals could result in a LSE to any qualifying features of European sites, and if so, which ones.</u></p> <p>(Please see also ID 3.3.4 of Table 3.3).</p>
3.2.5.	Humber Estuary SAC and Ramsar	<p><u>Physical processes – indirect effects as a result of impacts to the Smithic Bank</u></p> <p>See ID 3.1.3 of Table 3.1.</p>	See ID 3.1.3 of Table 3.1.	See ID 3.1.3 of Table 3.1.
3.2.6.	The Wash and North Norfolk SAC	<p><u>Harbour seal – vessel collision risk</u></p>	The Applicant [e-pages 385 and 395 of REP1-038 and e-page 10 of REP3-046] stated that harbour seals are relatively small, highly mobile and are expected to detect vessels in close proximity and	The ExA notes that the Applicant refers to AEoI in [REP4-045], thus inferring it agrees a LSE

Table 3.2: Marine mammals				
ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
		<p>The Applicant screened out a LSE to harbour seal from collision risk [AS-012].</p> <p>However, NE [Appendix D of RR-029, e-page 113][response to ExQ1 HRA.1.6 in AS-029][REP2-082] raised concerns of collision risk whilst vessels are in transit to or from ports. It requested information on likely or confirmed locations of ports for construction and operation, anticipated vessel transit routes, vessel density, seal densities and estimates of number of individuals impacted.</p>	<p>largely avoid collision. It confirmed that a vessel management plan would determine vessel routing to and from construction areas and ports to minimise encounters with marine mammals as far as reasonably practicable (secured in the draft DCO (dDCO) through Schedule 11, Part 2 - Condition 13(1)(d)(v) and Schedule 12, Part 2 - Condition 13(1)(d)(v)).</p> <p>The Applicant presented the information requested by NE in [REP4-045].</p> <p>NE [Tab D, cell K15 of REP5-112] considered that the Applicant's assessment and proposal for mitigation to reach the conclusion, demonstrated there to be a LSE.</p>	<p>should be screened in for harbour seal due to vessel collision, as per NE's position.</p> <p><u>The Applicant is requested to confirm if the ExA's assumption is correct.</u></p>

Table 3.3: Issues raised by the ExA and IPs in relation to the Applicant's screening of LSEs (alone and in combination) in relation to offshore and intertidal ornithology

Table 3.3: Offshore and intertidal ornithology				
ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
3.3.1.	FFC SPA Humber Estuary SPA	<p><u>Changes to physical processes – all project phases</u></p> <p>The Applicant did not assess changes to physical processes on FFC SPA or Humber Estuary SPA [matrices 24 and 26 of AS-012].</p> <p>NE [e-page 130 of RR-029] advised that changes to physical processes should be screened in for all phases.</p>	<p>The Applicant noted that FFC SPA is further from the proposed development than Flamborough Head SAC and considered no further assessment is required.</p> <p>The Applicant [e-page 420 of REP1-038] considered that, "there is no basis for any changes in hydrodynamics to extend to the Humber Estuary SAC/SPA/Ramsar nor any physical processes pathway that would reach the Humber Estuary designated sites" and referred to Table 6 of the HRA Screening Report [REP2-005].</p>	<p><u>Questions to NE:</u></p> <p><i>NE is requested to <u>provide reasoning for its request to screen in changes to physical processes to the FFC SPA and Humber Estuary SPA and confirm which qualifying features it considers a LSE should be identified for.</u></i></p>
3.3.2.	FFC SPA	<p><u>Changes to hydrodynamic regime (as a result of impacts to Flamborough Front) during operation</u></p> <p>The Applicant did not assess impacts of changes to physical processes (including the hydrodynamic regime) on FFC SPA.</p>	See ID 3.2.2 of Table 3.2.	<p><u>Question to NE:</u></p> <p><i>See ID 3.2.2 of Table 3.2; the ExA's question applies equally to FFC SPA.</i></p> <p><i>NE is also requested to clarify which qualifying features its concerns relate to.</i></p>

Table 3.3: Offshore and intertidal ornithology

ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
		NE advised [e-page 130 of RR-029] that impacts to SNS SAC from changes to the hydrodynamic regime (as a result of potential impacts to Flamborough Front) should be screened in.		
3.3.3.	FFC SPA	<p><u>Changes to physical processes - indirect effects on prey availability</u></p> <p>The Applicant screened out LSE to all features of the FFC SPA (Matrix 24 of AS-012 and Table 6 of REP2-005).</p> <p>However, as noted in ID 3.2.3 of Table 3.2, NE raised concerns about impacts on the Flamborough Front and resultant effects on prey availability [e-pages 20 and 70 of RR-029]. It requested further evidence to rule out potential prey availability issues to birds of the FFC SPA</p>	<p>As detailed above in paragraphs 3.3.5 to 3.3.13 of this RIES, the Applicant concluded that there would be no impacts to Flamborough Front.</p> <p>As noted in ID 3.2.3 of Table 3.2, the Applicant submitted document 'G5.10 Professor Mike Elliot's Marine Processes Report Review' [REP5-066] which concluded that the contents of nutrients in the area would not change, therefore it is unclear how primary production would change.</p> <p>The Applicant also submitted document 'G5.7 Indirect Effects Forage Fish and Ornithology' [REP5-085]. This identified Atlantic herring, sandeel and sprat as key forage fish of relevance to qualifying features of the FFC SPA. It stated that nursery grounds for these fish are located across the North Sea, rather than focused on a particular area near the front system. It also noted</p>	<p>The ExA awaits comments from NE on [REP5-085] at D6.</p> <p><u>Question to NE:</u></p> <p><i><u>NE is requested to confirm whether it considers there to be a LSE on qualifying features of the FFC SPA as a result of indirect effects on prey availability due to impacts on the Flamborough Front, and if so, to which qualifying feature(s)?</u></i></p>

Table 3.3: Offshore and intertidal ornithology

ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
		as a result of impacts on the Flamborough Front.	<p>that catch data for these species does not suggest any specific distribution of fish activity (or forage fish distribution as a proxy) associated with frontal features.</p> <p>It concluded, in Table 7, the following:</p> <ul style="list-style-type: none"> - That any nutrient and plankton upwelling is associated with the interaction between background hydrodynamic processes and bathymetry and not a function discrete to the Flamborough Front. - The presence of higher density hotspots for seabirds and forage fish to the south of the Hornsea Four array area is not likely to be linked to any front systems and is more likely to be a consequence of the natural bathymetry resulting in shallower waters. - The Flamborough Front plays a role in the productivity of the North Sea, however the interaction with the physical processes' changes associated with the Proposed Development would not alter biological functioning at a regional sea scale (North Sea), but it would be limited to 10s or 100s 	

Table 3.3: Offshore and intertidal ornithology

ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
			<p>of metres around the location of individual foundations.</p> <p>NE [REP5a-029] confirmed that it had been unable to review [REP5-085] by D5a, but that it would review by D6, where possible.</p>	
3.3.4.	FFC SPA	<p><u>Piling noise - indirect effects on prey availability (herring)</u></p> <p>See ID 3.2.4 of Table 3.2.</p>	See ID 3.2.4 of Table 3.2.	See ID 3.2.4 of Table 3.2.
3.3.5.	FFC SPA Farne Islands SPA	<p><u>Fulmar - displacement and disturbance</u></p> <p>NE [Appendix B of RR-029, e-page 45] noted that the Applicant screened out a LSE to fulmar due to low sensitivity to disturbance and displacement because they are often associated with fishing vessels. NE did not agree construction vessels and activities would have the same behaviours impact as fishing and advised a more robust rationale be provided.</p>	<p>The Applicant [e-page 216 of REP1-038] stated that agreement was reached with NE during pre-application that consideration of disturbance and displacement would be required for gannet, guillemot, razorbill and puffin only. It referred to the Evidence Plan Logs [APP-130].</p> <p>NE [HRA2.6 of REP5-111] subsequently agreed that LSE from disturbance and displacement can be excluded for fulmar as a named component of the breeding seabird assemblage at FFC SPA and as a component of the Farne Islands SPA.</p>	Matter resolved – no LSE agreed.

Table 3.3: Offshore and intertidal ornithology

ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
3.3.6.	FFC SPA	<p><u>Seabird assemblage</u></p> <p>NE [Appendix B of RR-029, e-page 45] requested full consideration be given to the potential impacts on the seabird assemblage feature of FFC SPA.</p>	<p>The Applicant [e-page 216 of REP1-038] responded that the seabird assemblage feature of the FFC SPA was assessed within the species-specific assessment sections for this designated site throughout the RIAA.</p> <p>During the Examination, the Applicant revised the ornithology baseline [REP5-087] (see Section 4.3 of this RIES for information) and provided a revised assessment in 'G5.25 Ornithology EIA and HRA Annex' [REP5-078]. In response to the ExA's Further Written Questions (ExQ2) HRA 2.7, the Applicant stated [REP5-074] that any impacts on the seabird assemblage would be assessed in [REP5-078]; however, an assessment is not provided within this document.</p>	<p>Question to NE:</p> <p><i><u>(i) Is NE content that potential impacts on the seabird assemblage feature of FFC SPA have been satisfactorily addressed?</u></i></p> <p><i><u>(ii) Does NE consider there to be LSE on the seabird assemblage feature of FFC SPA, if so for what impact-effect pathways?</u></i></p>
3.3.7.	FFC SPA	<p><u>Gannet and kittiwake - barrier effects</u></p> <p>The Applicant [Matrix 24 of AS-012] screened out a LSE from barrier effects to gannet and kittiwake during the operation and maintenance phase.</p>	<p>The Applicant [HRA 2.5 of REP5-074] explained that an assessment of potential barrier effects on gannet and kittiwake for the operation and maintenance phase was presented within ES Volume A2 Chapter 5 Offshore and Intertidal Ornithology [APP-017] and concluded negligible magnitude of impact and therefore neither species were screened in for assessment within the RIAA.</p>	<p>Questions to the Applicant and NE:</p> <p><i><u>(i) Can the Applicant confirm whether the screening conclusions presented in Matrix 24 of [AS-012] have altered as a result on the revised assessments [REP5-078]?</u></i></p>

Table 3.3: Offshore and intertidal ornithology

ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
		NE [REP2-083, REP3-015 and HRA2.5 of REP5-111] queried why the RIAA only considers barrier effects on auks and only during the construction phase.	The Applicant explained that the current (2022) ANCB interim displacement advice note states there is not enough evidence available to separate out and quantify barrier effects separately to displacement effects. Therefore barrier effects are accounted for in the revised displacement assessments presented in 'G5.25 Ornithology EIA and HRA Annex' [REP5-078], which covers all phases of the Proposed Development.	<i>(ii) Can NE confirm whether it agrees a LSE on gannet and kittiwake from barrier effects during all phases can be screened out?</i> <i>(iii) Is NE content that barrier effects are accounted for in the displacement assessments?</i>
3.3.8.	FFC SPA	<u>In-combination effects – herring gull</u> NE [Appendix B of RR-029, e-page 74] noted that herring gull (a component of the seabird assemblage feature) at FFC SPA were excluded from Population Viability Analysis (PVA) modelling without clearly ruling out in-combination LSE.	The Applicant did not explicitly respond to NE's comment. However, it explained [e-pages 266-267 of REP1-038] that the screening undertaken for offshore ornithology alone was precautionary. Where an effect from the Proposed Development alone was determined to be trivial and inconsequential, that would be well within the error margins of the assessment; therefore, such features and designated sites are not assessed further as there is no potential for any contribution to an in-combination effect to occur.	<u>Question to NE:</u> <i>The ExA notes that a LSE on herring gull from collision risk is identified in Matrix 24 of [AS-012]. NE is requested to clarify its position.</i>

Table 3.3: Offshore and intertidal ornithology

ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
3.3.9.	Humber Estuary SPA	<u>Physical processes – indirect effects as a result of impacts to the Smithic Bank</u> See ID 3.1.3 of Table 3.1.	See ID 3.1.3 of Table 3.1.	See ID 3.1.3 of Table 3.1.
3.3.10.	Humber Estuary SPA	<u>Physical processes – impacts from the temporary access ramp in the intertidal area</u> See ID 3.1.4 of Table 3.1.	See ID 3.1.4 of Table 3.1.	See ID 3.1.4 of Table 3.1.
3.3.11.	Greater Wash SPA	<u>Impacts from works in the ECC – marine processes</u> The Applicant did not assess effects of changes to physical processes on the Greater Wash SPA [Matrix 23 of AS-012]. NE stated [e-page 132 of RR-029] that impacts on the Greater Wash SPA from works in the ECC giving rise to effects on marine processes should be considered.	The Applicant [e-page 428 of REP1-038] stated that changes to physical processes from landfall activities would be localised and that works along the ECC would result in short-lived and localised elevated suspended sediment concentrations; as such, no impacts are predicted on the supporting habitats in the Greater Wash SPA. NE did not mention this site further in its representations relating to marine processes.	<u>Question to NE:</u> <i><u>Can NE confirm whether it has any remaining concerns relating to the Greater Wash SPA and if so, expand on the particular features of concern.</u></i>

Table 3.3: Offshore and intertidal ornithology

ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
3.3.12.	Farne Islands SPA	<p><u>Razorbill (as an unnamed component of the Farne Islands SPA seabird assemblage)</u></p> <p>Table 1 of the RIAA [REP5-012] states that razorbill, as a component of the seabird assemblage feature of Farne Islands SPA, was not included within the RIAA as it is outside the mean max plus 1 Standard Deviation.</p> <p>However, NE [Appendix B of RR-029, e-page 45] advised that a LSE on razorbill (a component of the seabird assemblage feature) should be screened in, as per the other auk species, or further evidence provided to clarify why LSE were not triggered.</p>	<p>The Applicant submitted report 'G2.11 Razorbill Assessment: Alone and In combination Farne Islands SPA' [REP2-047]. This reiterated the conclusion of no LSE and stated that the Farne Islands SPA population of razorbill would be an extremely minor component of the overall North Sea and English Channel Biologically Defined Minimum Population Scale (BDMPS) across the wider non-breeding season. Applying NE's range of displacement mortality rates, it predicted mortality of less than one breeding adult bird from the Farne Islands SPA across the non-breeding season. The Applicant concluded that this is so low as to be considered no material contribution to the natural baseline mortality rates at this colony and would not provide any meaningful contribution to in-combination effects.</p> <p>NE [Tab B, cell G72 of REP3-054] noted the Applicant's assessment was based on modelled abundance estimates that may be subject to revision and requested an updated version of document G2.11 [REP2-047] be submitted alongside revised displacement assessment for auks.</p>	<p><u>Question to the Applicant and NE:</u></p> <p><u><i>In [REP2-047] and [REP3-054], the Applicant and NE refer to AEOI. Please can the Applicant and NE confirm the ExA's understanding that both parties agree there is a LSE on razorbill of the Farne Islands SPA?</i></u></p>

Table 3.3: Offshore and intertidal ornithology				
ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
			The Applicant submitted document G5.9 Revised Ornithology Baseline [REP5-087] at D5. At ISH6 (29 April 2022), the Applicant stated it was confident that the revised baseline would not be materially different and that an update to G2.11 would therefore not be required.	
3.3.13.	Lindisfarne SPA Lindisfarne Ramsar Tips of Corsemaul and Tom Mor SPA	These sites are identified in the Applicant's screening report [REP2-005] within the initial site selection process (Table 3), but none of them is included in Table 6 (or 7).	n/a – not questioned in the Examination to date.	<u>Questions to the Applicant and NE:</u> <u>(i) Can the Applicant clarify whether Lindisfarne SPA, Lindisfarne Ramsar and the Tips of Corsemaul and Tom Mor SPA have been subject to full HRA screening?</u> <u>(ii) Can NE confirm whether it has any comment in relation to exclusion of LSE for Lindisfarne SPA, Lindisfarne Ramsar and the Tips of Corsemaul and Tom Mor SPA?</u>

Table 3.4: Issues raised by the ExA and IPs in relation to the Applicant's screening of LSEs (alone and in combination) in relation to effects on onshore ecology

Table 3.4: Onshore ecology				
ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
3.4.1.	Humber Estuary SPA	<p>Effects on little tern and breeding and non-breeding 51</p> <p>were not assessed by the Applicant [Matrix 26 of AS-012].</p> <p>Table 1 of the HRA Screening Report [e-page 30 of REP2-005] states that NE advised to screen out little tern for all sites. There is no such statement in respect of bittern.</p>	<p>The Applicant screened out little tern and breeding/ non-breeding bittern in its Screening Report matrices [Matrix 26 of AS-012] due to there being no pathway for effect from the Proposed Development.</p> <p>NE's initial conclusions [Table 3.1, RR-029] do not comment on bittern and little tern as features of the Humber Estuary SPA that it considered could be affected by the Proposed Development.</p> <p>In the SoCG [REP1-050], the RSPB agrees that the Applicant's RIAA has identified all relevant features of designated sites for the assessment.</p>	<p>Questions to the Applicant and NE:</p> <p><u>The ExA is not aware of any concerns raised by IPs in respect of bittern.</u></p> <p><u>The ExA seeks confirmation from NE that LSE can be excluded for the bittern qualifying feature of the Humber Estuary SPA.</u></p>

Table 3.5: Issues raised by the ExA and IPs in relation to the Applicant's screening of LSEs (alone and in combination) in relation to migratory fish

Table 3.5: Migratory fish				
ID	European site	Issue	Applicant's response and relevant documents	ExA observation / question
3.5.1.	Humber Estuary SAC and Tweed Estuary SAC	<p><u>Lamprey</u></p> <p>NE [Summary Tab, cell A65 of REP3-054] [REP3-015] stated that it would have expected to see the lamprey features of the Humber Estuary and Tweed Estuary SACs considered in the HRA.</p>	None	<p>This matter was not included in NE's relevant representation [RR-029]. The ExA notes that impacts on lamprey of the Humber Estuary were considered by the Applicant, but all LSEs were screened out [Matrix 6b of AS-012]. The Applicant did not include the Tweed Estuary SAC in its assessment.</p> <p><u>Question to NE:</u></p> <p><u>NE is requested to expand on its comments relating to lamprey:</u></p> <p><u>(i) Does NE consider that further screening is required for the Tweed Estuary SAC? Please include details of any impact-effect pathway considered to be credible in your response.</u></p> <p><u>(ii) Noting the Applicant's consideration of impacts on lamprey of the Humber Estuary SAC, as noted above, does NE consider there to be a LSE? Please provide details of the feasible impact pathway if so.</u></p> <p><u>Question to the Applicant:</u></p> <p><u>The Applicant is invited to comment on this matter.</u></p>

3.4 Summary of HRA Screening outcomes during the Examination

- 3.4.1 The Applicant concluded that there would be no LSE on the River Derwent SAC, Lindisfarne SPA, Lindisfarne Ramsar and Tips of Corsemaul and Tom Mar SPA; this has not been disputed.
- 3.4.2 The Applicant concluded LSE on 36 European sites for which the UK is responsible. These European sites have also been discussed further in Section 4 with regard to potential effects on site integrity.
- 3.4.3 Details of disputes with the ANCB/ IPs and the ExA's queries regarding the conclusion of no LSE for some of the qualifying features and impact pathways of the following European sites are detailed in Tables 3.1 to 3.5. The ExA understands that only one matter has been resolved (ID 3.3.5 of Table 3.3). The ExA seeks responses from the Applicant and NE, where indicated, to provide clarity on the outstanding matters.

Q.3.4.1. NE is also invited to comment as to whether it considers there are any additional LSEs that are not identified in the Applicant's screening matrices or detailed in Tables 3.1 to 3.5.

Q.3.4.2. The ExA is not aware of any concerns being raised in relation to LSEs from in-combination effects. IPs are invited to comment.

4 ADVERSE EFFECTS ON INTEGRITY

4.1 Conservation Objectives

- 4.1.1 Section 9 of the RIAA [REP5-012] summarises site-specific information for all sites included in the Applicant's assessment of effects on integrity. It is supported by [APP-171] to [APP-173] which identify the conservation objectives for all sites. The Applicant's HRA report makes reference to NE supplementary advice throughout.
- 4.1.2 The ExA asked the Applicant in ExQ1 (HRA.1.1) to respond to NE advice in [e-page 7 of RR-029] that formal site citations and conservation objectives could be subject to change. The Applicant's response [REP2-038] confirmed its understanding that the information underpinning the RIAA was not likely to change prior to July 2022, and it committed to an updated RIAA by D5 if affected by any changes. NE confirmed [REP2-082; AS-028] that citations are fixed and high-level conservation objectives remain constant, but that Conservation Advice Packages are updated regularly and advised that the information relied on in the RIAA should be assumed as fixed from April 2022.
- 4.1.3 An updated RIAA was submitted by the Applicant at D5 [REP5-012] which did not identify any change to the conservation objections or Conservation Advice Packages relating to the European sites assessed.

Q.4.1.1. The ExA understands that: at the point of reporting there is agreement that the conservation objectives applied to the Applicant's assessment are correct in all cases, and; that there are no disputes over the interpretation of the conservation objectives in the information provided to support the competent authority's appropriate assessment. IPs are invited to comment.

4.2 The Integrity Test

Potential for adverse effects on site integrity

- 4.2.1 The European sites and qualifying features for which LSE were identified were further assessed by the Applicant to determine if they could be subject to AEoI from the Proposed Development, either alone or in combination. The application version of the RIAA [APP-167] concluded that AEoI could be excluded for all sites and features assessed.
- 4.2.2 However, the Applicant updated its assessment [REP1-010], which concluded that the project **could result in AEoI** on FFC SPA due to:
- in-combination effects of collision on kittiwake.
- 4.2.3 The Applicant's revision of its assessment followed ExQ1 HRA 1.26 [PD-006] which asked the Applicant to consider its RIAA conclusions in light of recent decisions on the Norfolk Boreas and Norfolk Vanguard projects.
- 4.2.4 The Applicant set out its response to the ExA in [REP2-038] and also submitted a position paper [AS-023]. The Applicant's conclusion that there is a potential AEoI for the kittiwake interest feature of the FFC SPA in

combination is agreed with NE as the ANCB [REP3-018] and is not disputed by any other IP.

- 4.2.5 The conclusions of the Applicant's RIAA have been disputed by NE and other IPs throughout Examination with regards to project alone and in-combination effects for a number of European sites and qualifying features. Matters of Examination at the point of reporting are summarised in Table 4.2 below.

4.3 Adverse Effects on Integrity from the Proposed Development Alone

- 4.3.1 A summary of the Applicant's assessment is presented in Table 63 of the Applicant's RIAA [REP5-012].
- 4.3.2 Table 4.1 below identifies the sites and features for which the Applicant's conclusion of no AEoI has either been agreed with the ANCB or not subject to specific comment by any IP. Therefore, it is the ExA's understanding at the point of reporting that AEoI for these sites and features could be excluded from the Proposed Development alone.

Q.4.3.1. IPs are invited to comment if the ExA's understanding set out in Table 4.1 below is incorrect.

Table 4.1 AEoI from the Proposed Development alone which could be excluded

ID	Qualifying features assessed	Assessment of potential impact for AEoI	Examination matters
SNS SAC			
4.1.1	Harbour porpoise	Vessel disturbance (all phases)	<p>The Applicant [Matrix 1 of REP1-012 and Sections 10.3 and 10.4 of APP-167] concluded no AEoI from the Proposed Development subject to the adoption of a vessel management plan secured in the dDCO through Schedule 11, Part 2 - Condition 13(1)(d)(v) and Schedule 12, Part 2 - Condition 13(1)(d)(v).</p> <p>NE [e-page 17 of RR-029] agreed that the project alone would not result in AEoI on the SNS SAC.</p>
		Vessel collision risk (all phases)	
4.1.2		Accidental pollution (all phases)	<p>The Applicant [Matrix 1 of REP1-012 and Sections 10.3 and 10.4 of REP5-012] concluded no AEoI from the Proposed Development subject to the development of a Marine Pollution Contingency Plan (MPCP) secured in the dDCO through Schedule 11, Part 2 - Condition 13(1)(d)(i) and Schedule 12, Part 2 - Condition 13(1)(d)(i).</p> <p>NE [e-page 17 of RR-029] agreed that the project alone would not result in AEoI on the SNS SAC.</p>
Flamborough Head SAC			
4.1.3	Reefs Submerged or partially submerged sea caves	Temporary increase in suspended sediment/ smothering (all phases)	<p>The Applicant [Matrix 2 of REP1-012 and Sections 10.3 and 10.4 of REP5-012] concluded no AEoI due to the short-term nature of the change in suspended sediments, the likelihood that any smothering would be quickly removed and the predicted lack of accumulation of sediment at the SAC.</p> <p>NE has not disputed the Applicant's conclusions.</p>
4.1.4		Introduction of hard substrate (invasive non-native species) (all phases)	

ID	Qualifying features assessed	Assessment of potential impact for AEoI	Examination matters
4.1.5		Accidental pollution (all phases)	The Applicant [Matrix 1 of REP1-012 and Sections 10.3 and 10.4 of REP5-012] concluded no AEoI from the Proposed Development subject to the development of a MPCP secured in the dDCO through Schedule 11, Part 2 - Condition 13(1)(d)(i) and Schedule 12, Part 2 - Condition 13(1)(d)(i). NE [e-page 17 of RR-029] agreed that the project alone would not result in AEoI on the SNS SAC.
The Wash and North Norfolk Coast SAC			
4.1.6	Harbour seal	Increase in underwater noise (construction and decommissioning)	The Applicant [Matrix 4 of REP1-012 and Sections 10.3 and 10.4 of APP-167] concluded no AEoI subject to mitigation within the Marine Mammal Mitigation Protocol (MMMP) ⁹ , the SNS SAC SIP ¹⁰ and an anticipated requirement for a UXO MMMP (if/when a UXO licence is applied for). NE has not disputed the Applicant's conclusion.
4.1.7		Vessel disturbance (all phases)	The Applicant [Matrix 4 of REP1-012 and Sections 10.3 and 10.4 of APP-167] concluded no AEoI subject to the vessel management plan (see ID 4.1.1 of this table). NE has not disputed the Applicant's conclusion.
4.1.8		Vessel collision risk (all phases)	A LSE for vessel collision risk was not initially screened in by the Applicant - see ID 3.2.6 of Table 3.2. However, the Applicant [REP4-045] subsequently concluded no AEoI subject to the vessel management plan (see ID 4.1.1 of this table). NE agreed there would be no AEoI [Tab D, cell K15 of REP5-112].

⁹ The MMMP would reduce the risk of Permanent Threshold Shift auditory injury from driven or part-driven pile driving. Its implementation would be secured through Condition 13(1)(g) of the dDCO Schedule 11 and 12. The outline MMMP [APP-241] establishes the principles which would be implemented during construction.

¹⁰ See Table 4.3 for further information on the SIP.

ID	Qualifying features assessed	Assessment of potential impact for AEoI	Examination matters
Humber Estuary SAC and Ramsar and Berwickshire and North Northumberland Coast SAC			
4.1.9	Grey seal	Increase in underwater noise (construction and decommissioning)	The Applicant [Matrices 5a, 6a and 7 of REP1-012 and Sections 10.3.3 and 10.3.4 of REP5-012] concluded no AEoI subject to the MMMP, the SNS SAC SIP and an anticipated requirement for a UXO MMMP (if/ when a UXO licence is applied for (see ID 4.1.6 of this table). NE has not disputed the Applicant’s conclusion.
4.1.10		Vessel disturbance (all phases)	The Applicant [Matrices 5a, 6a and 7 of REP1-012 and Sections 10.3 and 10.4 of APP-167] concluded no AEoI subject to the vessel management plan (see ID 4.1.1 of this table). NE has not disputed the Applicant’s conclusion.
4.1.11		Vessel collision risk (all phases)	
Humber Estuary SAC			
4.1.12	Atlantic salt meadows Salicornia and other annuals	Nitrogen deposition (construction, decommissioning)	The Applicant [Matrix 5b in AS-016 and paragraphs 10.2.3.32 to 10.2.3.37 of REP5-012] concluded that the Proposed Development would contribute less than 1% of the critical levels for background nitrogen and thus no AEoI for all features as a result of the project alone. NE has not disputed the Applicant’s conclusion.
Humber Estuary Ramsar			
4.1.13	Saltmarsh	Nitrogen deposition (construction, decommissioning)	The Applicant [Matrix 6b in AS-016 and paragraphs 10.2.3.32 to 10.2.3.37 of REP5-012]) concluded that the Proposed Development would contribute less than 1% of the critical levels for background nitrogen and thus no AEoI for all features as a result of the project alone. NE has not disputed the Applicant’s conclusion.

ID	Qualifying features assessed	Assessment of potential impact for AEoI	Examination matters
Greater Wash SPA			
4.1.14	Red-throated diver Common scoter	Disturbance and displacement (all project phases)	The Applicant concluded no AEoI [Matrix 10 of REP1-012 and paragraphs 10.4.4.13-26 and 10.4.4.31-41 of REP5-012]. Following the Applicant's submission of G2.13 [REP2-049] relating to assessment of disturbance effects within the ECC, NE has agreed that AEoI from displacement of these species can be excluded from the Proposed Development alone (and in combination) [REP5-112].
4.1.15	Little gull	Collision (operation)	The Applicant concluded no AEoI [Matrix 10 of REP1-012 and paragraphs 10.4.4.225-231 of REP5-012]. NE has not disputed the Applicant's conclusion.
Humber Estuary SPA and Ramsar			
4.1.16	All ornithological features screened in [REP5-012]	Collision risk (operation)	The Applicant concluded that AEoI could be excluded from the Proposed Development alone [Matrices 6c and 12 of REP1-012 and paragraphs 10.4.4.280-285 of REP5-012]. NE [e-page 131 of RR-029] identified Humber Estuary SPA supporting habitats as potentially affected, however no concerns have been raised in relation to the conclusion of no AEoI in relation to collision risk.
Hornsea Mere SPA, Northumbria Coast SPA, Teesmouth and Cleveland Coast SPA			
4.1.17	Relevant ornithological features screened in [REP5-012]	Collision (operation)	The Applicant concluded no AEoI for all these European sites having identified potential LSE in relation to the bird species identified in Section 8 of [REP5-012]. The Applicant's assessment can be found in: <ul style="list-style-type: none"> Hornsea Mere SPA (gadwall) – [Matrix 13 of REP1-012 and paragraphs 10.4.4.286-290 of REP5-012]. Northumbria Coast SPA (Arctic tern) – [Matrix 14 of REP1-012 and paragraphs 10.4.4.320-331 of REP5-012]. Teesmouth and Cleveland Coast SPA (common tern and Sandwich tern)– [Matrix 15 of REP1-012 and paragraphs 10.4.4.320-331 of REP5-012].

ID	Qualifying features assessed	Assessment of potential impact for AEoI	Examination matters
			NE [Table 3.1 of RR-029] did not identify any of these sites as potentially affected, and no concerns have been raised in relation to the conclusion of no AEoI in relation to collision risk by any IPs.

- 4.3.3 Table 4.2 below identifies where the Applicant's conclusion of no AEoI in relation to the identified LSE on the qualifying features listed has been disputed by IPs during the course of the Examination, or where uncertainty around the screening for LSE and inclusion of matters in the Applicant's assessment of AEoI was raised during the Examination to date. This table reflects the ExA's understanding at the point of reporting and identifies where clarification on IPs' positions is sought.
- 4.3.4 Of particular relevance to these conclusions were the following matters:
- the potential for impacts on Smithic Bank from the Proposed Development, and resultant effects on European Sites;
 - concerns around the modelling carried out by the Applicant to characterise the ornithological baseline; and
 - concerns about the methodology used by the Applicant to assess the effects of collision, disturbance and displacement impacts.
- 4.3.5 To avoid duplication in Tables 4.2 and 4.3 below, an introduction to these matters is provided below.

Smithic Bank

- 4.3.6 The ES [APP-013] describes Smithic Bank as a headland-associated banner type bank maintained by local sediment supply with cliff erosion from the south the likely primary source of sandy material. The offshore export cable would cross Smithic Bank and that the export cable would cross the Dogger Bank A&B export cables seaward of the Bank [Figure 1.9 of APP-013]. The RIAA assessed the potential impacts of the Proposed Development on Smithic Bank and concluded there would therefore be no change in physical processes within Flamborough Head SAC [e-page 127 of REP5-012] and no impact on supporting habitats to grey seal and their prey of Humber Estuary SAC and Ramsar, and Berwickshire and North Northumberland Coast SAC [e-page 155 of REP5-012].
- 4.3.7 NE [e-pages 20, 132 and 133 of RR-029] stated that Smithic Bank provides shelter to the Holderness Coast and acts a sediment store. It raised concerns that changes in elevation of Smithic Bank from cable installation and cable protection, along with alterations to sediment transport due to the Dogger Bank A&B Cable Crossing, could modify the Holderness shoreline response to storm waves and modify the Holderness shoreline morphology over the lifetime of the project and its installed infrastructure. This could indirectly affect other marine process receptors including Humber Estuary SAC, SPA and Ramsar site and Flamborough Head SAC.
- 4.3.8 The Applicant [e-pages 176 and 426 of REP1-038] refuted NE's position. It stated in document 'G4.9 Marine Processes Supplementary Report' [e-pages 33 and 56 of REP4-043] that there is a general absence of sediment exchange between Smithic Bank and the Holderness Coast, and that cable installation and landfall activities would not affect the supply of sediment to the Holderness Coast.

- 4.3.9 The Applicant also submitted document 'G5.10 Professor Mike Elliot's Marine Processes Report Review' [REP5-066] which concluded that modification of the shoreline is possible but questioned if it is probable.
- 4.3.10 However, NE stated [Tab E, cell K20 of REP5-112] that there is evidence to suggest there is sediment exchange between the Holderness Coast and Smithic Bank, so it cannot rule out potential adverse effects to the sandbank structure and function due to the landfall works. It considered that impacts of any cable protection on Smithic Bank, cable remediation or replacement and the location of the Dogger Bank A&B Cable Crossing has not been sufficiently assessed. It also requested that any sediment removed from the sandbank be retained within the sandbank system and pre- and post-cable monitoring with swathe bathymetry is carried out. These comments were echoed by the MMO [REP5-107].
- 4.3.11 The MMO and NE [e-page 37 of REP5-107] [Summary tab, cells D38 and D39 of REP5-112] requested that no cable protection be placed on Smithic Bank. They highlighted that considerable uncertainty remains in relation to the baseline characterisation of Smithic Bank and advised that further consideration be given to potential impacts in the context of the HRA.
- 4.3.12 In response to document G4.9 [REP4-043], NE, the MMO and Cefas [REP5-114] raised concerns that successive cable and cable protection installations from multiple developments could act cumulatively to increase morphological alteration of sandbank and therefore sought a detailed cumulative assessment. NE considered that cable protection on Smithic Bank could alter hydrodynamics and sediment transport with associated morphological impacts.
- 4.3.13 NE proposed [REP5-112] a list of mitigation and monitoring requirements for the Applicant to consider. The MMO [REP5-107] raised a number of queries on the Applicants report [REP4-043] and similarly requested mitigation and monitoring options.
- 4.3.14 The Applicant responded in [REP5a-017] by detailing existing project commitments (Table 3) and responding to the mitigation and monitoring suggested by NE, the MMO and Cefas (Tables 4 and 5).
- 4.3.15 The ExA considers this matter to be unresolved at the point of publication of the RIES.

Characterisation of the ornithological baseline

- 4.3.16 In its relevant representation [e-page 39 of RR-029], NE advised that it could not agree with the baseline estimates of abundance and density for several species of birds where model-based methods (MRSea)¹¹ had been used in place of design-based methods. The species are fulmar, gannet, kittiwake, great black-backed gull, guillemot, razorbill and puffin, and are all qualifying features screened in for assessment for one or more of the European sites concerned. The RSPB made similar comments [RR-033] and responded to the ExA's written questions [PD-006] reiterating its view

¹¹ Statistical package to model spatial count data and predict spatial abundances; developed by the Centre for Research into Ecological and Environmental Modelling (CREEM) specifically for dealing with data collected for offshore wind farm projects.'(Taken from [APP-078]).

that conclusions on AEoI could not be drawn until the baseline matters were resolved, specifically with regards to the qualifying features of FFC SPA [REP2-090].

- 4.3.17 Subsequently, the conclusions drawn from the assessments using these estimates could also not be agreed, including the implications for AEoI of the sites affected [e-page 47 of RR-029]. NE asked for validation of MRSea via a comparison with raw data or design-based estimates [e-page 63 of RR-029]. The Applicant responded to NE and the RSPB's points in Annex 5 and Annex 7, respectively, of [REP1-038].
- 4.3.18 This matter was raised by the ExA [ExQ1 HRA 1.10 of PD-006] and discussed at ISH6 (29 April 2022). The Applicant confirmed that it intended to submit a re-run of the MRSea estimates for gannet and prepare a comparison, stating agreement with NE that - should the revised results not be significantly different - no further modelling for other species would be undertaken. This information was submitted by the Applicant as it became available [REP2-046], [REP3-029] and [REP4-047]. The revised baseline for gannets [REP4-47] revealed a difference of less than one breeding adult for impacts apportioned to the FFC SPA, however NE provided comments on the Applicant's submissions [REP4-055] indicating further concerns with the analysis.
- 4.3.19 NE's current position [REP5-112] agrees, in-principle, the scope of a revised MRSea assessment of the baseline for gannet, kittiwake, guillemot and razorbill. It agreed that fulmar, great black-backed gull and puffin did not need to be included and that 'design-based' estimates of abundance and density would be appropriate [REP5-080].

Ornithological assessment data gaps and methodology

- 4.3.20 NE also raised matters around the ornithological assessment for a number of species qualifying features, which it considered to undermine the reliance that could be placed on its conclusions, and therefore prevented NE from being in a position to agree that AEoI could be excluded for the sites affected [e-page 47 of RR-029]. The RSPB made similar comments [RR-033], supporting NE's view that AEoI could not be excluded, specifically on the qualifying features of FFC SPA.
- 4.3.21 The matters discussed in the Examination to date are complex and the detail is not rehearsed here. In broad terms the matters raised were:
- data gaps in relation to auk species (guillemot, razorbill, puffin);
 - inaccurate or insufficiently justified assumptions applied to modelling of effects (broadly relating to breeding seasons, bird behaviour, apportioning, population age-structures, mortality rates, productivity rates, and foraging range and behaviour);
 - issues with the spatial and statistical methods used, and the representation and application of the modelled outcomes, in particular those of the PVA modelling relating to collision effects;

- lack of clarity in how elements of the modelling were derived, or the assumptions made.
- 4.3.22 The ExA explored these matters [PD-006], [PD-009], at ISH5 (28 April 2022) and ISH6 (29 April 2022). The Applicant responded to NE and the RSPB [REP1-038] and subsequently submitted information addressing displacement effects on auks [REP1-069] and gannets [REP2-045], and at D4, 'G4.7 Ornithological Assessment Sensitivity Report' [REP4-041]. Ongoing discussion on these matters has taken place, and the Applicant has made a number of submissions responding to the points raised [REP2-085], [REP3-054], [REP4-054].
- 4.3.23 NE's comments on the Applicant's submissions are summarised in [REP5-112]. NE also provided further advice to the Applicant in relation to apportioning of gannet and kittiwake [REP5-116] and assessment of displacement for auks [REP5-115].

Position on the above ornithological matters at D5 and 5a

- 4.3.24 The RSPB provided detailed comments on submissions at D3 and D4, confirming agreement with the advice provided by NE in relation to ornithological matters [REP5-120].
- 4.3.25 The Applicant submitted an updated 'G4.7 Ornithological Assessment Sensitivity Report' at D5 [REP5-087], and a revised version at D5a [REP5a-009] addressing NE's advice [REP5-080][REP5a-030]. The Applicant also submitted a document revising the EIA and HRA displacement, disturbance and collision outputs for gannet, great black-backed gull, kittiwake, guillemot, razorbill and puffin on the basis of the revised baseline [REP5-078], updated as [REP5a-011].
- 4.3.26 In response to the ExA's further written questions [ExQ2 ME2.8, PD-012], NE confirmed agreement with the scope of works to the revised baseline [REP5-0111] as did the RSPB [REP5-119].
- 4.3.27 The Applicant responded to NE's additional D5 guidance [REP5a-018] confirming the advice has been addressed within [REP5-078] or presented alongside the Applicant's approach where disagreement with NE's recommendations remains. The Applicant disagreed with certain methodological points raised by NE and acknowledged that implications remain for the outcomes of the HRA and the need for and quantum of compensation that may be required for gannet and auk species.
- 4.3.28 The ExA considers these matters to be subject to ongoing discussion at the point of publication of the RIES, noting the submissions at D5 and D5a on which future commentary is anticipated from IPs.
- 4.3.29 It is worth noting that the submissions relating to these issues from all parties have focussed on the implications for FFC SPA. However, the ExA seeks clarity from NE and the RSPB on whether any of these issues preclude a view being reached in relation to AEoI alone or in combination on the other European sites for which the affected bird species are qualifying features assessed.

[Q. 4.3.2. Can NE and the RSPB please clarify this matter in relation to the other European sites assessed, aside from FFC SPA?](#)

Table 4.2 AEoI from the Proposed Development alone cannot currently be excluded (e.g., where matters are disputed by IPs or uncertainties exist)

ID	Qualifying features assessed	Assessment of AEoI	Examination matters
SNS SAC			
4.2.1	Harbour porpoise	Increase in underwater noise (all phases)	<p>The Applicant [Matrix 1 of REP1-012 and Sections 10.3.3 and 10.3.4 of REP5-012] concluded no AEoI subject to mitigation within the MMMP and the SNS SAC SIP and an anticipated requirement for a UXO MMMP (if/when a UXO licence is applied for) (see ID 4.1.6 of Table 4.1).</p> <p>NE [e-pages 17 and 119 of RR-029] initially agreed with the conclusion of no AEoI for the project alone with respect to mortality and injury when taking into account the measures in the piling outline MMMP. However, it requested that the number of individuals within the area of Permanent Threshold Shift (PTS) from piling noise be presented [e-page 115 of RR-029]. This was presented by the Applicant [e-page 390 of REP1-038]. NE subsequently advised [e-page 25 of REP3-015] that the assessment had increased the number of individuals at risk of PTS and the current mitigation would not mitigate the full PTS zone and should be revisited. This matter is stated to be an ongoing point of discussion in the most recent Statement of Common Ground between the Applicant and NE [REP3-015].</p> <p><u><i>The Applicant and NE are requested to provide an update on this matter. Please can NE confirm whether it agrees an AEoI can be excluded?</i></u></p>
4.2.2		Changes to sediment transport regime	<p>LSE screened out by the Applicant - see ID 3.2.1 of Table 3.2. Conclusions regarding screening and, subsequently AEoI, are unclear to the ExA.</p> <p><u><i>NE is requested to confirm its position.</i></u></p>
4.2.3		Changes to hydrodynamic regime (as a result of impacts to Flamborough	<p>Not initially screened in by the Applicant - see ID 3.2.2 of Table 3.2. The ExA understands NE is unable to conclude no AEoI due to uncertainties regarding the extent of effects from impacts on Flamborough Front (see paragraphs 3.3.5 to 3.3.13 of this RIES).</p>

ID	Qualifying features assessed	Assessment of AEoI	Examination matters
		Front) during operation	<i>NE is requested to confirm its position.</i>
4.2.4		Changes to physical processes - indirect effects on prey availability	LSE screened out by the Applicant - see ID 3.2.3 of Table 3.2. The ExA understands NE is unable to conclude no AEoI due to uncertainties regarding the extent of effects from impacts on Flamborough Front (see paragraphs 3.3.5 to 3.3.13 of this RIES). <i>NE is requested to confirm its position.</i>
4.2.5		Piling noise - indirect effects on prey availability (herring)	Not assessed by the Applicant – see ID 3.2.4 of Table 3.2. Conclusions regarding screening and, subsequently AEoI, are unclear to the ExA. <i>NE is requested to confirm its position.</i>
Flamborough Head SAC			
4.2.6	Reefs	Changes to physical processes (operation)	The Applicant concluded [e-page 127 of REP5-012] that due to the localised effect of changes to physical processes, including scour affecting the Smithic Bank, that there would be no AEoI on the reef feature of the Flamborough Head SAC. The ExA understands NE is unable to conclude no AEoI due to uncertainties regarding the extent of effects from impacts on Smithic Bank (see paragraphs 4.3.6 to 4.3.15 of this RIES) and Flamborough Front (see paragraphs 3.3.5 to 3.3.13 of this RIES). <i>NE is requested to confirm its position.</i>
4.2.7	Unclear (see ID 3.1.2 of Table 3.1)	Changes to hydrodynamic regime (as a result of impacts to Flamborough Front)	LSE screened out by the Applicant - see ID 3.1.2 of Table 3.1. The ExA understands NE is unable to conclude no AEoI due to uncertainties regarding the extent of effects from impacts on Flamborough Front (see paragraphs 3.3.5 to 3.3.13 of this RIES). <i>NE is requested to confirm its position.</i>

ID	Qualifying features assessed	Assessment of AEoI	Examination matters	
Moray Firth SAC				
4.2.8	Bottlenose dolphin	Increase in underwater noise (construction and decommissioning)	Applicant concluded no AEoI for the same reasoning as ID 4.1.6 of Table 4.1.	NE [e-page 122 of RR-029] deferred to NatureScot to comment on the suitability of the assessment of impact to the Moray Firth SAC. The Applicant [e-page 404 of REP1-038] confirmed that Scottish Natural Heritage (now NatureScot) was issued with the draft HRA Screening Report and the draft RIAA during the pre-application phase and that no comments were received from NatureScot in relation to these communications.
4.2.9		Vessel disturbance (all phases)	The Applicant [REP4-045] concluded there would be no potential for an AEoI for the same reasons as ID 4.1.1 of Table 4.1.	
4.2.10		Vessel collision risk (all phases)		
Humber Estuary SAC and Ramsar				
4.2.11	Grey seal	Changes to physical processes	LSE screened out by the Applicant – see ID’s 3.1.1 and 3.1.3 of Table 3.1. The ExA understands NE is unable to conclude no AEoI due to uncertainties regarding the extent of effects from impacts on Smithic Bank (see ID 4.2.14 below) and Flamborough Front (see ID 4.2.12 below). <i>NE is requested to confirm its position.</i>	
4.2.12		Changes to hydrodynamic regime (as a result of impacts to Flamborough Front)	LSE screened out by the Applicant - see ID 3.2.2 of Table 3.2. The ExA understands NE is unable to conclude no AEoI due to uncertainties regarding the extent of effects from impacts on Flamborough Front (see paragraphs 3.3.5 to 3.3.13 of this RIES). <i>NE is requested to confirm its position.</i>	
4.2.13		Changes to physical processes - indirect effects	LSE screened out by the Applicant - see ID 3.2.3 of Table 3.2. The ExA understands NE is unable to conclude no AEoI due to uncertainties regarding	

ID	Qualifying features assessed	Assessment of AEoI	Examination matters
		on prey availability	the extent of effects from impacts on Flamborough Front (see paragraphs 3.3.5 to 3.3.13 of this RIES). <i>NE is requested to confirm its position.</i>
4.2.14	Unclear (see ID 3.2.5 of Table 3.2)	Physical processes – indirect effects as a result of impacts to the Smithic Bank	LSE screened out by the Applicant - see ID 3.2.5 of Table 3.2. The ExA understands NE is unable to conclude no AEoI due to uncertainties regarding the extent of effects from impacts on Smithic Bank (see paragraphs 4.3.6 to 4.3.15 of this RIES). <i>NE is requested to confirm its position.</i>
Greater Wash SPA			
4.2.15	Unclear (see ID 3.3.11 of Table 3.3)	Marine processes - impacts from works in the ECC	LSE on supporting habitats screened out by the Applicant - see ID 3.3.11 of Table 3.2. Conclusions regarding screening and, subsequently AEoI, are unclear to the ExA. <i>NE is requested to confirm its position.</i>
Humber Estuary SPA and Ramsar			
4.2.16	Unclear (see ID 3.3.1 of Table 3.3)	Changes to physical processes (all project phases)	Impacts not assessed by the Applicant - see ID 3.3.1 of Table 3.3. The ExA understands NE is unable to conclude no AEoI due to uncertainties regarding the extent of effects from impacts on Smithic Bank (see paragraphs 4.3.6 to 4.3.15 of this RIES) and Flamborough Front (see paragraphs 3.3.5 to 3.3.13 of this RIES). <i>NE is requested to confirm its position.</i>
4.2.17	Unclear (see ID 3.3.2 of Table 3.3)	Changes to hydrodynamic regime (as a result of impacts	LSE screened out by the Applicant - see ID 3.3.2 of Table 3.3. NE's conclusions regarding AEoI are unclear to the ExA. <i>NE is requested to confirm its position.</i>

ID	Qualifying features assessed	Assessment of AEoI	Examination matters
		to Flamborough Front)	
4.2.18	Unclear (see ID 3.3.9 of Table 3.3)	Physical processes – indirect effects as a result of impacts to the Smithic Bank	LSE screened out by the Applicant - see ID 3.3.9 of Table 3.5. The ExA understands NE is unable to conclude no AEoI due to uncertainties regarding the extent of effects from impacts on Smithic Bank (see paragraphs 4.3.6 to 4.3.15 of this RIES). <i><u>NE is requested to confirm its position.</u></i>
Flamborough and Filey Coast SPA			
4.2.19	Kittiwake Gannet Herring gull (assemblage)	Collision (operation)	The Applicant concluded no AEoI from the Proposed Development alone for all qualifying features. [Matrix 11 of REP1-012 and paragraphs 10.4.4.232-279 of REP5-012]. NE was unable to exclude AEoI from the Proposed Development alone or in combination, citing concerns around the robustness of the characterisation of the ornithological baseline, and concerns about the methodology of the assessment carried out by the Applicant [RR-029]. Many of the points raised by NE in regard to the modelling were also made by the RSPB [RR-033]. These matters are expanded upon in Section 4.3 above. <i><u>NE is requested to provide its position following submissions received from the Applicant since D5 specifically in relation to collision effects on these qualifying features.</u></i>
4.2.20	Gannet Guillemot Razorbill Puffin	Displacement and disturbance (all project phases)	The Applicant concluded no AEoI from the Proposed Development alone for all qualifying features. [Matrix 11 of REP1-012 and paragraphs 10.4.3.27-77 and 10.4.4.42-139 of REP5-012]. NE was unable to exclude AEoI from the Proposed Development alone or in combination due to the matters identified above (see Section 4.3 above). <i><u>NE is requested to provide its position following submissions received from the Applicant since D5 specifically in relation to disturbance and displacement</u></i>

ID	Qualifying features assessed	Assessment of AEoI	Examination matters
			<u>effects on these qualifying features.</u>
4.2.21	Gannet	Combined collision and disturbance	<p>The Applicant concluded no AEoI from the Proposed Development alone for all qualifying features. [Matrix 11 of REP1-012 and paragraphs 10.4.4.367-373 of REP5-012].</p> <p>NE was unable to exclude AEoI from the Proposed Development alone or in combination due to the matters identified above (see Section 4.3)</p> <p><u>(i) NE is requested to provide its position following submissions received from the Applicant since D5 specifically in relation to combined collision and disturbance/ displacement effects on gannet.</u></p> <p><u>(ii) The ExA understands that advice regarding gannet macro avoidance is expected to change imminently. Can NE confirm whether the guidance has been updated and if so, what are the implications for the assessment of effects on the gannet qualifying feature of FFC SPA?</u></p>
4.2.22	Guillemot Razorbill Puffin Gannet* Kittiwake*	Barrier effect (operation) *LSE screening issues raised see Table 3.3 ID 3.3.7	<p>The Applicant concluded no AEoI from the Proposed Development alone for all qualifying features. [Matrix 11 of REP1-012 and paragraphs 10.4.4.374-378 of REP5-012].</p> <p>NE was unable to exclude AEoI from the Proposed Development alone or in combination due to the matters identified above (see Section 4.3).</p> <p>Screening issues were raised in relation to gannet and kittiwake (for which the Applicant screened out of further assessment of barrier effects).</p> <p><u>NE is requested to provide its position following submissions received from the Applicant since D5 specifically in relation to barrier effects on these qualifying features.</u></p>
4.2.23	Unclear (see ID 3.3.1 of Table 3.3)	Changes to physical processes (all project phases)	Impacts not assessed by the Applicant - see ID 3.3.1 of Table 3.3. The ExA understands NE is unable to conclude no AEoI due to uncertainties regarding the extent of effects from impacts on Smithic Bank (see paragraphs 4.3.6 to

ID	Qualifying features assessed	Assessment of AEoI	Examination matters
			4.3.15 of this RIES) and Flamborough Front (see paragraphs 3.3.5 to 3.3.13 of this RIES). <i><u>NE is requested to confirm its position.</u></i>
4.2.24	Unclear (see ID 3.3.2 of Table 3.3)	Changes to hydrodynamic regime (as a result of impacts to Flamborough Front) during operation	LSE screened out by the Applicant - see ID 3.3.2 of Table 3.3. The ExA understands NE is unable to conclude no AEoI due to uncertainties regarding the extent of effects from impacts on Flamborough Front (see paragraphs 3.3.5 to 3.3.13 of this RIES). <i><u>NE is requested to confirm its position.</u></i>
4.2.25	Unclear (see ID 3.3.4 of Table 3.3)	Changes to physical processes - indirect effects on prey availability	LSE screened out by the Applicant - see ID 3.3.4 of Table 3.3. The ExA understands NE is unable to conclude no AEoI due to uncertainties regarding the extent of effects from impacts on Flamborough Front (see paragraphs 3.3.5 to 3.3.13 of this RIES). <i><u>NE is requested to confirm its position.</u></i>
4.2.26	Unclear (see ID 3.3.4 of Table 3.3)	Piling noise - indirect effects on prey availability (herring)	Not assessed by the Applicant – see ID 3.3.4 of Table 3.3. Conclusions regarding screening and, subsequently AEoI, are unclear to the ExA. <i><u>NE is requested to confirm its position.</u></i>
Farne Islands SPA			
4.2.27	Razorbill (as an unnamed component of the Farne Islands SPA)	Displacement	Not assessed by the Applicant – see ID 3.3.4 of Table 3.3.12. <i><u>(i) NE stated in [REP3-054] that it would agree there would be no AEoI for razorbill if the impacts remain the same as reported in [REP2-047] further to the revised abundance estimates. Can the Applicant confirm whether the mortality predicted in [REP2-047] has changed further to the revision of abundance estimates? Does the Applicant intend to revise [REP2-047]?</u></i>

ID	Qualifying features assessed	Assessment of AEOI	Examination matters
	seabird assemblage)		<i>(ii) NE is requested to confirm its position.</i>
Coquet Island SPA, Farne Islands SPA, Northumberland Marine SPA			
4.2.28	Relevant ornithological features screened in [REP5-012]	Collision (operation)	<p>The Applicant concluded no AEOI for all these European sites having identified potential LSE in relation to the bird species identified in Section 8 of [REP5-012]. The Applicant's assessment can be found in:</p> <ul style="list-style-type: none"> Coquet Island SPA – Matrix 16 of [REP1-012] and paragraphs 10.4.4.320-331 and 10.4.4.332-340 of [REP5-012]. Farne Islands SPA – Matrix 17 of [REP1-012] and paragraphs 10.4.4.341-349 and 10.4.4.320-331 of [REP5-012]. Northumberland Marine SPA – Matrix 38 and paragraphs 10.4.4.320-331 and 10.4.4.350-359 of [REP5-012]. <p>NE [Table 3.1 of RR-029] identified Coquet Island SPA and Farne Islands SPA as potentially affected by the proposed development, and raised points in relation to screening for the Farne Islands SPA (see Table 3.3, ID 3.3.5 and 3.3.12). No comments directly disputing the Applicant's conclusions to exclude AEOI have been noted, however, some of the qualifying features assessed are the same species of birds affected by the ongoing discussions in relation to the ornithological baseline characterisation and assessment methodology (set out above in Section 4.3).</p>
4.2.29		Disturbance and displacement (all phases)	<p>The Applicant concluded no AEOI for all these European sites having identified potential LSE in relation to the bird species identified in Section 8 of [REP5-012]. The Applicant's assessment can be found in:</p> <ul style="list-style-type: none"> Coquet Island SPA (puffin) – Matrix 16 [REP1-012] and Section 10.4.3 Paras 78-87 and 10.4.4 Paras 140-149 [REP5-012]. Farne Islands SPA (puffin, guillemot)– Matrix 17 [REP1-012] and paragraphs 10.4.3.88-105 and 10.4.4.150-169 [REP5-012].

ID	Qualifying features assessed	Assessment of AEoI	Examination matters
			<ul style="list-style-type: none"> Northumberland Marine SPA (puffin, guillemot)– Matrix 38 and 10.4.3 106-124 and 10.4.4 170-190 of [REP5-012]. <p>As for collision risk, the ExA understands that conclusions on AEoI from disturbance and displacement are not agreed in light of the ongoing discussions. However, the ExA is not aware of any specific concerns in relation to these sites.</p> <p><i><u>NE is requested to confirm its position in relation to AEoI from collision risk and disturbance and displacement for Coquet Island SPA, Farne Islands SPA, and Northumberland Marine SPA.</u></i></p>
Scottish SPAs assessed by the Applicant for operational effects only: St Abb's Head and Fast Castle SPA; Forth Islands SPA; Outer Firth of Forth and St Andrew's Complex pSPA; Fowlsheugh SPA; Buchan Ness to Collieston Coast SPA; Troup, Pennan and Lion's Heads SPA; East Caithness Cliffs SPA; North Caithness Cliffs SPA; Copinsay SPA; Hoy SPA; Marwick Head SPA; Rousay SPA; Calf of Eday SPA; West Westray SPA; Fair Isle SPA; Sumburgh Head SPA; Noss SPA; Foula SPA; Fetlar SPA; Hermaness, Saxa Vord and Valla Field SPA			
4.2.30	Relevant ornithological features screened in [REP5-012]	Collision (operation)	<p>No comments directly disputing the Applicant's conclusions to exclude AEoI have been noted, and NatureScot as the ANCB are not an IP. However, some of the qualifying features assessed are the same species of birds affected by the ongoing discussions in relation to the ornithological baseline characterisation and assessment methodology (set out above in relation to the FFC SPA and in Section 4.3 of this RIES).</p> <p><i><u>(i) While it is understood that NE are not the ANCB in relation to these sites, could NE comment on whether they agree with the ecological rationale for concluding AEoI for these sites?</u></i></p> <p><i><u>(ii) Can NE provide clarity on whether or not the matters raised in relation to the baseline characterisation and assessment methodology are relevant to these sites?</u></i></p>
4.2.31		Disturbance and displacement (operation)	

4.4 Adverse Effects on Integrity from the Proposed Development In Combination

- 4.4.1 The Applicant's methodology for assessment of in-combination effects on integrity is set out in Section 11 of the RIAA [REP5-012]. As for screening, the methodology applied a tier system to the projects considered in combination with the Proposed Development, to address differing levels of certainty in their contribution to in-combination effects. Table 29 of [REP5-012] lists the other projects considered for each receptor type excluding ornithology which is addressed in Section 11.4, and Section 8.2 set out the approach to tiering the projects considered.
- 4.4.2 Comments were received from NE on the tiering approach [RR-029], as noted in Section 3 above and described in more detail in Table 4.2 below.
- 4.4.3 In undertaking the in-combination assessment in the RIAA [REP5-012], the Applicant excluded the contribution of losses of kittiwake from FFC SPA from Hornsea Project Three Offshore Windfarm as this project had been consented by the Secretary of State with the inclusion of compensatory measures. The ExA (ExQ1 HRA. 1.8) explored whether the same rationale could be applied to other consented projects which included compensatory measures for kittiwake (namely, Norfolk Boreas and Norfolk Vanguard). The Applicant and NE agreed [REP2-038, AS-028] that these projects could be discounted from the in-combination tables. However, the RSPB was of the view that due to uncertainty of the effectiveness of these compensation measures, these effects could not be discounted [REP2-089].
- 4.4.4 The Applicant offered to submit revised in-combination totals removing these projects and the East Anglia ONE North and East Anglia TWO wind farms dependent on and subsequent to pending consenting decisions [REP2-038]. NE's response however, stated that **with or without** the contribution from Hornsea Three, Norfolk Vanguard, Norfolk Boreas, and East Anglia ONE North and East Anglia TWO (which have since received consent and secured compensatory measures for kittiwake) an in-combination AEoI from collision could not be excluded [AS-028].
- 4.4.5 The Applicant submitted additional information in relation to disturbance and displacement effects on red-throated diver and common scoter at D2 [REP2-049] to which NE responded in [REP3-054] agreeing that an in-combination AEoI could be excluded for the Greater Wash SPA.
- 4.4.6 All of the European site qualifying features identified in Table 4.1 were considered by the Applicant with respect to in-combination effects. Where effects from the Proposed Development alone were considered by the Applicant to be trivial and inconsequential, in-combination effects were excluded as the contribution of the Proposed Development would be imperceptible. NE raised concerns in relation to offshore ornithology in the use of this approach (see Table 4.3)[e-page 67 of RR-029].
- 4.4.7 The matters of Examination raised by NE and the RSPB in relation to the characterisation of the ornithological baseline and the assessment methodology are also relevant to the in-combination assessment, and

therefore the ExA's understanding is that the sites and features affected by these matters remain in dispute in relation to the conclusions of AEoI in combination.

- 4.4.8 In addition, the matters of Examination relating to the assessment of changes to physical processes and impacts to Smithic Bank and the Flamborough Front are also relevant to the in-combination assessment [e-pages 5 and 8 of REP5-114]. Therefore, the ExA's understanding is that the sites and features affected by these matters remain in dispute in relation to the conclusions of AEoI in combination.
- 4.4.9 Matters identified to date in the Examination in relation to the assessment of AEoI in combination are represented in Table 4.3.

Q4.4.1 IPs are invited to comment if the ExA's understanding set out in this section and in Table 4.3 and 4.4 with regards to the in-combination assessment methodology is incorrect.

Q4.4.2 IPs are invited to comment if the ExA's understanding set out in this section and in Table 4.3 and 4.4 below or the assessment outcomes is incorrect.

Table 4.3 AEoI cannot currently be excluded from the Proposed Development in combination (e.g., where matters are disputed by IPs or uncertainties exist)

ID	Qualifying features assessed	Assessment of AEoI	Examination matters	
Sites and features affected by LSE uncertainties in relation to impacts to Smithic Bank and/or Flamborough Front				
4.3.1	All affected features	Changes to physical processes (direct effects on supporting habitats or indirect effects on prey availability)	SNS SAC; Flamborough Head SAC; Humber Estuary SAC; Humber Estuary Ramsar; Humber Estuary SPA (see ID 4.2.4, ID 4.2.11, ID 4.2.13, ID 4.2.14, ID 4.2.16, ID 4.2.17, ID 4.2.18, ID 4.2.23, ID 4.2.24, ID 4.2.25)	<i>NE is asked to respond to the same questions identified in Section 4.3 and Table 4.2 in relation to the in-combination assessment.</i>
4.3.2		Indirect effects on prey availability from piling (herring)	SNS SAC (see ID 4.2.5) FFC SPA (see ID 4.2.26)	
4.3.3		Changes to sediment transport regime	SNS SAC (see ID 4.2.2)	
4.3.4		Changes to hydrodynamic regime	SNS SAC; Flamborough Head SAC; Humber Estuary SAC; Humber Estuary Ramsar; Humber Estuary SPA, FFC SPA (see ID 4.2.3, ID 4.2.7, ID 4.2.12, ID 4.2.17, ID 4.2.24)	
FFC SPA; Coquet Island SPA; Farne Islands SPA; Northumberland Marine SPA; Scottish SPAs				
4.3.5	All affected features	Collision risk, disturbance and displacement, barrier effects	It is the ExA's understanding that the matters affecting the characterisation of the ornithological baseline and the methodology of the ornithological assessment for the 'alone' assessment are equally relevant to the 'in-combination' assessment. <i>NE is asked to respond to the same questions identified in Section 4.3 and Table 4.2 in relation to the in-combination assessment – see Q 4.3.2 and ID 4.2.19 to 4.2.22, ID 4.2.28 to 4.2.29, and ID 4.2.30 to 4.2.31).</i>	

ID	Qualifying features assessed	Assessment of AEoI	Examination matters
The Wash and North Norfolk SAC; Humber Estuary SAC; Humber Estuary Ramsar; Berwickshire and North Norfolk Coast SAC; Moray Firth SAC; FFC SPA; Coquet Island SPA; Farne Islands SPA; Northumberland Marine SPA; Scottish SPAs; SNS SAC			
4.3.6	All affected features	Pathways excluded by the Applicant from the in-combination assessment due to trivial/ inconsequential effects from the Proposed Development alone.	<p>For a number of the impact-effect pathways on qualifying features, the Applicant concluded that the effects from the Proposed Development alone were trivial/ within what could be expected as a result of natural variation in baseline mortality, and that they could make no perceptible/ consequential contribution to effects in combination [REP5-012]. For this reason, an in-combination assessment for those features in relation to those impact-effect pathways was excluded. It is noted that the precise rationale and justification for the approach varies with the feature and impact pathway being assessed and is set out in the RIAA in each case.</p> <p>The ExA understands that this approach has been accepted practice where alone effects can be shown to be imperceptible. However, NE raised a concern with this rationale in relation to offshore ornithology [e-page 67 RR-029] and [REP5-112]. The ExA understands this matter to be resolved in relation to The Greater Wash SPA (see paragraph 4.4.5 of this RIES).</p> <p><i>NE is requested to identify any features and relevant impact-effect pathways where it disagrees with the rationale for excluding an in-combination assessment.</i></p>
SNS SAC			
4.3.7	Harbour porpoise	Increase in underwater noise (all phases)	The Applicant [Matrix 1 of REP1-012 and Sections 10.3.3 and 10.3.4 of REP5-012] concluded that an AEoI can be excluded subject to the implementation of the SNS SAC SIP ¹² .

¹² The SIP process was proposed by the Applicant to address uncertainty with regard to potential in-combination disturbance impacts from multiple projects, specifically in relation to the risk of an exceedance of the ANCB defined underwater noise disturbance thresholds. Schedule 11, Part 2 and Schedule 12, Part 2 Condition 13(1)(j)) of the dDCO requires a SNS SAC SIP to be submitted to the MMO for approval prior to the commencement of driven or part-driven foundations. The outline SIP [APP-246] identifies potential mitigation measures which could be implemented if required.

ID	Qualifying features assessed	Assessment of AEoI	Examination matters
			<p><u>Approach to the assessment - tiers</u></p> <p>NE [e-pages 17, 113 and 118 of RR-029 and REP3-015] noted that different tiers were used in the RIAA in-combination assessment and the Cumulative Effects Assessment in the ES. The Applicant [e-page 27 of REP3-046] explained that the RIAA tiering structure was more detailed than for the ES cumulative effects assessment and considered a wider scope of projects. It provided a side-by-side comparison, which NE [Tab D, cell K16 of REP5-112] was content with.</p> <p><u>Seismic surveys and UXO clearance</u></p> <p>NE [e-pages 17, 113 and 118 of RR-029][REP3-015] also advised that seismic surveys, which the Applicant proposed to capture in the SNS SAC SIP, should be included in the in-combination assessment. The Applicant [e-page 27 of REP3-046] explained that the exclusion of seismic surveys was because of the difficulty in undertaking an illustrative in-combination assessment in the absence of detailed information. However, NE advised [Tab D, cell I17 of REP5-112] that a nominal seismic survey should be included to ensure the potential avenue of impact is accounted for. It also advised that a high-order UXO detonation be included in the in-combination assessment [Tab D, cell I27 of REP5-112]</p> <p>The Applicant submitted document 'G5.36 Clarification note on Seismic Surveys' [REP5a-020]. It acknowledged that the in-combination assessment had already concluded that there is a risk that the 20% disturbance thresholds for the SNS SAC would be exceeded even without the seismic surveys and UXO detonation being included, and thus the Applicant had committed to mitigation through the SIP. Nevertheless, it assessed a worst-case scenario of all Tier 1c offshore wind farm projects being constructed simultaneously alongside at least one seismic survey and one high-order UXO operation, which again concluded there is a risk of exceeding the disturbance thresholds. The Applicant stated that the SIP would require consideration of all known activities at the time of production of the final version, therefore it would capture any relevant UXO or seismic surveys with relevant details</p>

ID	Qualifying features assessed	Assessment of AEoI	Examination matters
			<p>available and would ensure on a case-by-case basis that the threshold is not exceeded.</p> <p>NE was unable to comment on document G5.36 prior to publication of this RIES.</p> <p><u>SIP content and process</u></p> <p>NE [e-page 17 of RR-029][response to ExQ2 HRA2.1 in REP5-111] stated that there are various scenarios whereby underwater noise thresholds would be exceeded on an in-combination basis. Ultimately, it could not rule out an AEoI for in-combination disturbance impacts due to the current over-reliance on the SIP process to manage in-combination impacts to the SNS SAC. NE explained this issue is not unique to the Proposed Development and advised that a mechanism to manage, monitor and review multiple SIPs over varying timescales needs to be developed and put in place by Regulators. The Applicant [e-page 165 of REP1-03] noted NE's comment, but considered the SIP process to be the most appropriate mechanism for managing in-combination impacts.</p> <p>Notwithstanding its objection in principle, NE made a number of comments on the outline SIP [e-page 123 of RR-029], which were responded to by the Applicant at e-pages 405-407 of [REP1-038]. The Applicant confirmed that the outline SIP would be updated, however this had not been received by the time of publication of this RIES. NE [Tab D of REP5-112] stated that these matters remained unresolved at D5.</p> <p><u>Can the Applicant confirm if it intends to revise the outline SIP for SNS SAC?</u></p> <p>The MMO [response to ExQ1 HRA 1.16 in REP3-052][e-page 6 of REP5-107] stated it was confident in the current SIP process, although it requested a standard condition be applied in relation to designated sites for harbour porpoise. The Applicant [response to ExQ2 HRA 2.1 in REP5-074] did not consider it necessary to amend the drafting of the condition 13(1)(j) of Part 2 of Schedules 11 and 12, which it considered to be more precise and enforceable and specifically requires the MMO to be satisfied that mitigation avoids AEoI.</p>

ID	Qualifying features assessed	Assessment of AEoI	Examination matters
			<p>The MMO did not respond to this matter at D5a [REP5a-027].</p> <p><u>Mitigation</u></p> <p>NE [e-pages 18, 113 and 118 of RR-029][REP3-015][response to ExQ2 HRA2.1 in REP5-111] supported the Applicant's suggested approach to reducing noise impacts. However, it noted that measures would be managed post-consent through the SIP process. It raised concerns over the feasibility of adding mitigation at this late stage when decisions around cost, equipment type etc. have already been made and recommended that a commitment to delivering mitigation (including noise abatement systems (NAS)) should be secured at this stage, with the later outcomes of the SIP determining if mitigation measures can be removed.</p> <p>The Applicant [e-page 167 of REP1-038] did not consider it necessary to include commitments at this stage on the basis that specific mitigation measures would be determined, in consultation with the relevant ANCB, following confirmation of final hammer energies and foundation types, collection of additional survey data and information on emerging technologies; this would include at-source mitigation if required. It also provided document 'G2.14: Clarification Note on Underwater Noise Abatement Systems' [REP2-050] to demonstrate that wind speed, wave heights, water depths and current speeds at the site would not be limiting factors for NAS. NE [Tab D, cell G25 of REP5-112] agreed the site is suitable for NAS but maintained mitigation should be committed to at this stage.</p>

5 ALTERNATIVES AND IROPI

5.1 Overview

- 5.1.1 The Applicant submitted a derogation case with its application, entitled 'B2.5 Volume B, Chapter 5: Without Prejudice Derogation Case' [APP-182]. This document was amended as set out in [AS-017] to address some matters of clarification in its drafting raised in the pre-Examination period. The Applicant submitted an updated without-prejudice derogation case at D1 [REP1-014], capturing its updated position that there would be an AEoI on FFC SPA due to collision risk to kittiwake in combination with other plans or projects during operation [as detailed in AS-023]. [REP1-014] confirmed that the Applicant's position remained that there would no AEoI on the kittiwake qualifying feature of FFC SPA from the project alone and that there would be no AEoI for all other European sites from the project alone or in combination.
- 5.1.2 The Applicant's derogation case included information relating to the kittiwake, gannet, guillemot and razorbill qualifying features of the FFC SPA. The updated derogation case does not include information in relation to any of the other European sites or qualifying features for which an adverse effect on integrity remains uncertain.
- 5.1.3 The Applicant's information considered the application of alternative solutions and imperative reasons of overriding public interest (IROPI) under the HRA process.
- 5.1.4 The ExA explored whether any further design changes or mitigation amounting to alternative solutions that could reduce or avoid AEoI were under consideration in ExQ1 HRA 1.21 [PD-006] and ExQ2 HRA 2.2 [PD-012]. The Applicant's response in [REP2-038] stated that while some parameters were to be refined the changes would have no implications for the information supporting the HRA. Some parameters were subsequently reduced in 'Clarification Note: Justification of Offshore Maximum Design Scenarios' [REP3-035]. NE commented at D5 [REP5-111] that the uncertainties around the ornithological baseline modelling prevented further advice. However, it noted in relation to benthic and marine processes, that the Applicant's refinements [REP3-035] did not exclude risks to Smithic Bank and Flamborough Front (see [REP5-114] for further details).

Q.5.1.1. The ExA's understanding is that further parameter refinement (relating to the Maximum Design Scenarios) is desired by NE but is not currently proposed by the Applicant.

(i) NE, the RSPB and other IPs are invited to comment specifically on the implications in relation to the 'alternative solutions' test.

(i) Can the Applicant confirm whether there are any further refinements or mitigation under consideration? If so, is there evidence that they would result in a lesser adverse effect on integrity for any of the sites and features concerned?

- 5.1.5 In its position statement in Appendix 2 of [REP1-057], British Petroleum Exploration Operating Company Ltd (BP), on behalf of the Endurance Carbon Capture project, raised EIA matters that might arise in the event that its requested Protective Provisions were to be adopted. These Protective Provisions ostensibly amount to 'no overlap' between Endurance and Hornsea Four. The ExA addressed the matter [ES 2.2 PD-012], to which the Applicant responded [REP5-074] and submitted its analysis [REP5a-016], which expanded its scope to consideration of HRA. The Applicant concluded no material difference to the conclusions of the HRA and refutes the 'no overlap solution' as an alternative solution which would result in lesser adverse effects. The Applicant has noted subsequent updates are to be submitted at D7 [REP5-074].

6 COMPENSATORY MEASURES

6.1 Overview

- 6.1.1 The Applicant submitted a suite of documents at application relating to proposed compensatory measures [APP-183 to APP-202], and a description of the proposed compensatory measures is also set out and assessed in EIA terms in the Applicant's ES [APP-057].
- 6.1.2 Throughout the Examination to date, matters relating to the proposed compensatory measures have been raised by IPs, including NE, the RSPB, The Wildlife Trusts and East Suffolk Council. Key themes raised are:
- the uncertainties around ornithological modelling outcomes and the likely quantum of compensation required if AEoI cannot be excluded;
 - timing of delivery, implementation long-term and lifetime of the measures;
 - ecological connectivity between the affected European site and the proposed compensation sites;
 - appropriateness, effectiveness, maturity and technical feasibility of proposed measures;
 - the level of detail within the information presented by the Applicant;
 - securing mechanism and funding.
- 6.1.3 The Applicant submitted further documents including 'G1.50 Compensation measures for FFC SPA Derogation and Compensation Update Positions Statement' [REP1-071] and 'G3.4 Compensation measures for FFC SPA: Compensation Connectivity Note' [REP3-032] and Annex [REP3-034]. An updated derogation case [REP1-014] has been provided along with updates to the Applicant's compensation measures at D1, D2 and D5. The Applicant has also responded directly to comments from IPs made throughout the Examination.
- 6.1.4 The ExA explored these matters in ExQ1 [PD-006], ExQ2 [PD-012] and at ISH6 (29 April 2022). The details of these matters are not rehearsed here. However, in relation to the purpose of the RIES it is noted that discussions on the themes identified above are ongoing at the point of reporting and are reflected in submissions at D5 as well as SoCG between the Applicant and NE [REP1-036] and the RSPB [REP3-020].
- 6.1.5 The Applicant's screening exercise for LSE in HRA terms for the compensatory measures themselves [APP-179 and APP-180] concluded no potential AEoI. The ExA explored some of the specific matters around this (ExQ1 HRA 1.30 and HRA 1.50 [PD-006]; and at ISH6 29 April 2022). The Applicant responded to written questions [REP2-038] and to ISH6 Action Point 9 [REP4-040]. The Applicant's conclusion that AEoI could be excluded for the future compensation delivery works remained the case, as reflected [REP1-071] and [REP5-015].

Q.6.1.1. NE, the RSPB and other IPs are invited to comment regarding any outstanding concerns around the impacts of the proposed compensatory measures.

- 6.1.6 The Applicant's proposed compensation measures relate only to FFC SPA and the qualifying features of kittiwake, gannet, guillemot and razorbill. With the exception of kittiwake, the measures have been put forward on a 'without prejudice' basis with the Applicant maintaining that AEoI can be excluded for all other sites and qualifying features, as explained above in Section 4.

Table 6.1: Compensatory measures proposed, taken from REP1-071

Compensatory measure	Option	Location	Kittiwake	Gannet	Guillemot	Razorbill
Offshore nesting	New	Southern North Sea				
Offshore nesting	Repurposed	Southern North Sea				
Onshore nesting	New	Cayton Bay to Newbiggin by the Sea				
	New	Suffolk Coast				
Bycatch reduction		South coast of England				
Predator eradication		Islands within the Baliwick of Guernsey				
Fish habitat enhancement	Seagrass	Humber Estuary				

- 6.1.7 The ExA examined matters relating to the securing of the compensatory measures in the dDCO, around the timing of their delivery, and around funding (ExQ1 HRA 1.24, HRA 1.25, HRA 1.33, HRA 1.51) [PD-006]. The Applicant responded [REP2-038] that the measures for kittiwake are to be implemented via Schedule 16 and Article 49 of the dDCO introduced at D1 [REP1-002], where deemed to be required by the Secretary of State. The latest version of the dDCO includes Schedule 16 [REP5a-002] as updated by drafting discussions throughout Examination. The Applicant maintains that as other compensatory measures for other qualifying features are proposed 'without prejudice' these are not included in Schedule 16 but has provided suggested drafting in [REP3-041] should the Secretary of State decide compensatory measures are required.
- 6.1.8 Matters to do with the design and implementation of compensatory measures lie outside of the scope of the RIES. However, the ExA would like to understand the current position on the need for compensatory

measures for European sites qualifying features where AEoI is uncertain, or conclusions are disputed.

Q.6.1.2. Compensatory measures are before the ExA in relation to kittiwake, gannet, guillemot, and razorbill of the FFC SPA. NE, the RSPB and other IPs are invited to comment regarding any other sites or features where exclusion of AEoI is uncertain and therefore compensatory measures may be required, and the likely scope of such measures.

Strategic compensation

- 6.1.9 In its application, the Applicant proposed a project-specific approach to without-prejudice compensation for the potentially affected interest features of the FFC SPA, supported by more general contributions to industry scale fisheries management and prey fish habitat enhancement [e.g., Appendix A of APP-185].
- 6.1.10 At D5, the Applicant submitted that substantial progress had been made in understanding how marine ecological compensation could be delivered on a collaborative or strategic basis. It provided a summary of ongoing activities and workstreams in document 5.8, 'Ørsted's approach to strategic ecological compensation' [REP5-086]. This suggested that the UK Government's British Energy Security Strategy (April 2022)¹³ (BESS) provides clear support for strategic compensation. It explained that the BESS introduced the Offshore Wind Environmental Improvement Package, which would generate a library of compensation measures that a developer could explore further on a project level, as well as the Marine Recovery Fund (MRF), which is intended for measures that are best enabled collaboratively through a strategic fund held by Government.
- 6.1.11 The Applicant's D5 amended compensation documents include an option to contribute to the MRF as a strategic alternative to the proposed and without-prejudice practical compensation measures and any adaptive management measures. Schedule 16, Part 1 of the draft DCO [REP5-088] included specific wording to secure the option to do this.
- 6.1.12 The Applicant concluded in [REP5-086] that the Secretary of State would be able to rely on a strategic approach in any decision to grant development consent for the Proposed Development. At the time of writing this RIES, other parties, including NE and the RSPB, had not had the opportunity to comment on this strategic alternative approach.

¹³ Available at: <https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy>

7 CONCLUDING REMARKS

- 7.0.1 This report is based on information submitted throughout the Examination by the Applicant and IPs, up to D5a (4 July 2022), in relation to potential effects on European Sites. It should be read in conjunction with the Examination documents referred to throughout.
- 7.0.2 The intention and purpose of the RIES is to ensure that IPs including the ANCBs are consulted formally for the purposes of Habitats Regulations matters, having regard to the legal duty upon the competent authority to do so.
- 7.0.3 The other aim of the RIES is to identify and close any gaps in the ExA's understanding of IPs' positions on Habitats Regulations, in relation to all sites and features of interest as far as possible, in order to support a robust and thorough recommendation to the Secretary of State.
- 7.0.4 The responses to the questions posed within the RIES and comments received on it will be of great value to the ExA in achieving this aim, and any comments would be gratefully received. They must be submitted for D8 (18 August 2022 at noon).
- 7.0.5 Following consultation, the responses will be considered by the ExA in making its recommendation to the Secretary of State and will be made available to the Secretary of State along with this report. The RIES will not be revised following consultation.