RWE Renewables UK Dogger Bank South (West) Limited

RWE Renewables UK Dogger Bank South (East) Limited

Dogger Bank South Offshore Wind Farms

Report to Inform Appropriate Assessment

Habitats Regulations Assessment

Volume 6

Appendix A – Habitats Regulations Assessment Screening

June 2024

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Company:	**RWE Renewables UK Dogger Bank South (West) Limited and RWE Renewables UK Dogger Bank South (East) Limited**	Asset:	**Development**
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Glossary

Term	Definition
Accommodation Platform	An offshore platform (situated within either the DBS East or DBS West Array Area) that would provide accommodation and mess facilities for staff when carrying out activities for the Projects.
Array Areas	The DBS East and DBS West offshore Array Areas, where the wind turbines, offshore platforms and array cables would be located. The Array Areas do not include the Offshore Export Cable Corridor or the Inter-Platform Cable Corridor within which no wind turbines are proposed. Each area is referred to separately as an Array Area.
Array Cables	Offshore cables which link the wind turbines to the Offshore Converter Platform(s).
Dogger Bank South (DBS) Offshore Wind Farms	The collective name for the two Projects, DBS East and DBS West.
Electrical Switching Platform (ESP)	The Electrical Switching Platform (ESP), if required would be located either within one of the Array Areas (alongside an Offshore Converter Platform (OCP)) or the Export Cable Platform Search Area.
Inter-Platform Cables	Buried offshore cables which link offshore platforms.
Offshore Converter Platforms (OCPs)	The OCPs are fixed structures located within the Array Areas that collect the AC power generated by the wind turbines and convert the power to DC, before transmission through the Offshore Export Cables to the Project's Onshore Grid Connection Points.
Offshore Development Area	The Offshore Development Area for ES encompasses both the DBS East and West Array Areas, the Inter-Platform Cable Corridor, the Offshore Export Cable Corridor, plus the associated Construction Buffer Zones.

Term	Definition
Offshore Export Cable Corridor	This is the area which will contain the offshore export cables (and potentially the ESP) between the Offshore Converter Platforms and Transition Joint Bays at the landfall.
The Applicants	The Applicants for the Projects are RWE Renewables UK Dogger Bank South (East) Limited and RWE Renewables UK Dogger Bank South (West) Limited. The Applicants are themselves jointly owned by the RWE Group of companies (51% stake) and Masdar (49% stake).
The Projects	DBS East and DBS West (collectively referred to as the Dogger Bank South Offshore Wind Farms).

Acronyms

Term	Definition
AEoI	Adverse Effect on Integrity
AoS	Area of Search
cSAC	Candidate Special Area of Conservation
DBS	Dogger Bank South
DCO	Development Consent Order
EMF	Electromagnetic Fields
EU	European Union
HDD	Horizontal Directional Drilling
HRA	Habitats Regulations Assessment
HVDC	High Voltage Direct Current
IAMMWG	Inter-Agency Marine Mammal Working Group
INIS	Invasive Non-Indigenous Species
LSE	Likely Significant Effect
MLWS	Mean Low Water Springs
MMMP	Marine Mammal Mitigation Protocol
MU	Management Unit
MW	Megawatt
MWHS	Mean High Water Springs
NE	North East
NGET	National Grid Electricity Transmission

Term	Definition
O&M	Operation & Maintenance
OCP	Offshore Converter Platform
PAH	Polyaromatic Hydrocarbon
pSPA	Proposed Special Protection Area
PTS	Permanent Threshold Shift
SAC	Special Area of Conservation
SNCB	Statutory Nature Conservation Body
SCI	Site of Community Interest
SD	Standard Deviation
SE	South East
SPA	Special Protection Area
TJB	Transition Joint Bay
TTS	Temporary Threshold Shift
UK	United Kingdom
UXO	Unexploded Ordnance
ZOI	Zone of Influence

1 Introduction

1.1 Overview

1. In November 2017, The Crown Estate announced a new round of offshore wind leasing. In September 2019, the final bidding areas were announced, and the Offshore Wind Leasing Round 4 was launched. As part of the Round 4 process, developers were able to identify preferred sites within bidding areas defined by The Crown Estate. Applications were then submitted by developers under a competitive bidding process, culminating in an auction held in February 2021. RWE Renewables UK (Swindon) Ltd (hereafter referred to as 'RWE Renewables') was successful in this auction process, securing preferred bidder status on two adjacent projects, Dogger Bank South (DBS) East and DBS West, collectively known as the DBS offshore wind farms (hereafter 'the Projects').

2. The array areas are located more than 100km offshore on the Dogger Bank in the southern North Sea and each covers approximately 500km^2.

1.2 Habitats Regulations Assessment

3. This document has been produced to inform the HRA process for the Projects. It provides information to enable the screening of the Projects with respect to their potential to have a likely significant effect (LSE) on designated nature conservation sites (hereafter 'European sites'). It should be noted that the Projects will be assessed separately, but included in a single submission. This approach will cover the possibility that one or the other of the Projects are developed, as well as both Projects being developed, either concurrently or sequentially. The scope of this document covers all relevant European sites and relevant qualifying interest features seaward of Mean High Water Springs (MHWS), potential impacts of offshore and intertidal infrastructure seaward of MHWS on onshore sites landward of (Mean Low Water Springs) MLWS, and potential impacts of onshore infrastructure on sites landward of MHWS. European sites are proposed to be "screened out" where no LSE from the Projects is predicted. Where LSE cannot be ruled out at this stage the European sites will be "screened in" and assessed further.

4. Following the United Kingdom's (UK) departure from the European Union (EU) on 31 December 2020, the UK is no longer an EU Member State. However, through the Conservation of Habitats and Species Amendment (EU Exit) Regulations 2019 (the "EU Exit Regulations") the HRA process implemented under the Habitats Regulations continues to apply, subject only to minor changes. EU Exit-related changes to the Habitats Regulations are discussed in more detail in section 3.1.1. However, these changes are considered to have no material implications on the requirement or process for a HRA for the Projects. This report will hereafter refer to the 'Habitats Regulations' as including any changes enacted by the EU Exit Regulations.

5. The Habitats Regulations require that an HRA must be carried out on all plans and projects that are likely to have significant effects on European sites, which include Special Areas of Conservation (SACs), candidate SACs (cSACs), Sites of Community Importance (SCI), Special Protection Areas (SPAs) and as a matter of policy, possible SACs (pSACs), potential SPAs (pSPAs) and Ramsar Sites (listed under the Ramsar Convention on Wetlands of International Importance – where also designated as a European site).

6. Following the UK's exit from the EU, European sites are still protected in the UK. The term "European site" has been retained, as has "Special Area of Conservation" and "Special Protection Area". However, these European sites are no longer part of the European Union's Natura 2000 network, instead SACs and SPAs form the National Site Network. Note that Ramsar sites are not included within the National Site Network but are still included within the HRA as they remain protected in the same way as SACs and SPAs.

1.3 This Document

7. A draft version of this document was previously issued to Natural England, the Environment Agency, Marine Management Organisation (MMO), Joint Nature Conservation Committee, Cefas and the Royal Society for the Protection of Birds (RSPB) on 13 December 2022.

8. Updates to the report have been made based on the comments received. Consultation comments, and the Projects responses to these comments, are detailed in **Table 1-1**.

Table 1-1 Consultation Responses on Draft HRA Screening

Comment	Project Response
MMO, 30/01/2023	
The MMO have no comments to make in regards to the Stage 1 screening report at this moment. MMO defer to comments made by Natural England (NE) and Environment Agency (EA) as Lead Competent Authorities on matters related to nature conservation. MMO wish to be included on future HRA discussions/reports so that we can consider whether any subsequent proposed mitigation, which are to be secured in an eventual Deemed Marine Licence (DML) meet the requirements of the MMO Enforcement Team. This means they must be drafted in a way that meets the following 5 criteria: 1) The condition must be necessary. 2) The condition must relate to the activity or development for which a DCO is sought. 3) The condition must be enforceable. 4) The condition must be precise. 5) The condition must be reasonable.	Noted with thanks, we will ensure that MMO are included in all future HRA consultation and discussions.
Natural England, 20/02/2023	
Natural England welcomes the opportunity to review the HRA screening report and provide feedback on it. Additional sites we feel should be screened in can be found below and our detailed comments are provided in Annex I.	Noted with thanks.
Internationally designated sites Natural England can confirm that the proposed works are located within Dogger Bank Special Area of Conservation (SAC), Southern North Sea SAC, the Greater Wash Special Protection Area (SPA) and Flamborough and Filey Coast SPA, all of which have been correctly screened into the HRA assessment. Natural England have reviewed the other adjacent (or within the zone of influence (ZOI)) sites scoped into the assessment and advise the following additional designated sites also have the potential to be impacted and should therefore be screened in	Noted with thanks.
<u>Humber Estuary SAC</u> Natural England advise that the Humber Estuary SAC is screened into the HRA assessment due to potential impacts on sediment transportation along the Holderness coast as a result of cable installation activities. The Annex 1 habitats of the Humber Estuary which could be impacted are: • Estuaries; • Mudflats and sandflats not covered by seawater at low tide; • Sandbanks which are slightly covered by seawater all the time; • Coastal lagoons; • Salicornia and other annuals colonising mud and sand Atlantic salt meadows (*Glauco Puccinellietalia maritimae*) At present, the Project is unable to provide any information on the likely requirements for external cable protection within the nearshore zone. External cable protection (and cable crossings) in shallow water depths could potentially alter nearshore sediment transport processes. The Project's landfall location at Skipsea is south of the longshore drift divide.	The Humber Estuary SAC has been screened in for further assessment, in section 4.1.4.

Comment	Project Response
Thus, longshore drift, combined with residual currents, drive the southwards movement of material along the coast to Spurn Head. In addition, tidal currents flow southwards during the flood tide (northwards with the ebb tide) leading to a net southwards residual current. Fine sediments eroded from the Holderness cliffs are transported into the Humber Estuary by flood tides and these finer sediments are considered to play an important role in the sediment budgets of the Humber Estuary and the Wash. As several Projects of material consideration are due to be making landfall along this coastline there is also potential for these impacts to act in-combination. We also do not have any details of potential installation of ancillary infrastructure in the nearshore such as cofferdams, HDD exit pits etc, which could also affect longshore sediment transport. Therefore, in line with advice provided to other projects in this area, we advise that The Humber Estuary SAC be screened into the assessment.	
Humber Estuary SPA / Ramsar Natural England considers that potential impacts on birds using functionally linked land associated with the Humber Estuary SPA/Ramsar from the proposed development cannot be ruled out at this time. The substation and onshore cabling area passes within 10km of the Humber estuary SPA and falls within the Impact Risk Zone (IRZ) for this site. This means there is potential for the land to be used by wintering waders and geese as part of their foraging ranges. We therefore advise that Humber Estuary SPA is screened into the HRA and evidence is collected and/or provided to demonstrate if the number of birds using the site is significant. Further details are provided on this in Annex 1	The Humber Estuary SPA / Ramsar has been screened in for further assessment in section 4.5.3.
Moray Firth SAC Natural England Advise that the Moray Firth SAC should be screened in to reflect the potential for bottlenose dolphins from this site to travel within the order limits and be impacted by underwater noise during construction works and UXO clearance. There is preliminary evidence that known individuals from the bottlenose dolphin population associated with the Moray Firth SAC travel down into English waters. This population has a predominantly inshore distribution and therefore has the potential to be impacted by inshore project activities.	The Moray Firth SAC has been screened in for further assessment in section 0.
The Wash and North Norfolk Coast SAC Natural England advise that The Wash and North Norfolk Coast SAC should be screened into the HRA assessment for impacts to the Harbour seal feature due to connectivity based on telemetry data and known foraging ranges (see Carter *et al.* 2022).	The Wash and North Norfolk Coast SAC has been screened in for further assessment in section 0.
Berwickshire and North Northumberland Coast SAC Natural England advise that Berwickshire and North Northumberland Coast SAC should be screened into the HRA assessment for impacts on the Grey seal feature due to connectivity based on telemetry data and known foraging ranges (see Carter et al. 2022).	The Berwickshire and North Northumberland Coast SAC has been screened in for further assessment in section 0.
Annex I: Detailed Comments	
Consideration of in-combination effects (Section 3.3.1) Natural England note that the Project has adopted a three tier approach to rank other projects in the in-combination assessment. We highlight that NE Best Practice Guidance published in 2022 advises the use of a seven tier approach (Section 11.1, Phase III Best Practice for Data Analysis and Presentation at Examination, March 2022) which we advise is used in this assessment moving forward. We note that for several thematic areas, insufficient information has been provided regarding the approach to in-combination assessment and the Projects to be included for us to meaningfully comment at this time.	The in-combination assessment methodology detailed in section 3.3.1 has been updated to reflect the most recent version of the Phase III Best Practice for Data Analysis and Presentation at Examination guidance.

Comment	Project Response
Sites designated for Annex I Habitats (Section 4.1) Natural England have concerns that the 50km in-combination search area for benthic impacts is not appropriate in all instances. We consider the HRA should take into consideration other offshore wind projects, especially those that are to be located within the Dogger Bank SAC (we note that Dogger Bank C is currently not considered). Where multiple projects impact a designated site, Natural England advise the screening area should be increased to encompass all projects impacting the features to be assessed within that site. Natural England advise that the Eastern Green Link 2 (EGL2) interconnect cable making landfall just south of Bridlington should be included in the assessment of in-combination impacts on Annex I habitats of Flamborough Head SAC. This project has submitted its licence application and is awaiting a decision so should be considered Tier 4 according to the NE Best Practice Guidance. Natural England request further evidence is provided to support the use of a 10km ZOI for suspended sediment. It is noted that the Project has based this on evidence from other offshore wind EIAs (such as the nearby Sofia and Dogger Bank C) [paragraph 92]. However, Natural England are concerned that these two projects follow a different export cable route and that this figure might not be suitable for the nearshore area where Dogger Bank South makes landfall. We highlight that recently examined offshore wind farms (OWF) such as Hornsea 4 used buffer zones 'scaled to represent the equivalent distance of tidal excursion on a mean spring tide', whereby two different values are used for tidal excursion noting the differences between the array area and offshore export cable corridor (approx. 10km for the array area and 15km for export cable corridor based on nearshore flows). We suggest a similar approach is taken for the Dogger Bank South Projects.	All offshore wind farms under planning, under construction or in operation within the Dogger Bank SAC will be considered in the in-combination assessment. The Eastern Link 2 HVDC cable, in addition to the Third Eastern Link HVDC cable (TGDC) and Fourth Eastern Link HVDC cable (E4L5) will also be considered in the in-combination assessment. The Zone of Influence (ZoI) for suspended sediment has been updated to 10km for the array areas and 15km for the offshore export cable corridor. This ZoI will be reviewed at Stage 2 of the HRA process, following the availability of site-specific data.
Sites designated for Annex II Migratory Fish (Section 4.2) Natural England advise that migratory fish species of the River Derwent SAC and Humber Estuary SAC should be screened into the HRA assessment for impacts from underwater noise. Underwater noise can propagate extremely well in saltwater, so behavioural impact ranges are likely to be in the 10's of km and Natural England advise a 50km buffer for further investigation for fish receptors is followed.	A 50km buffer for further investigation for fish receptors has been applied in section 4.2. River Derwent SAC and Humber Estuary SAC have been screened in for underwater noise impacts in relation to UXO clearance only (see section 4.2.4).
Sites Designated for Annex II Marine Mammals (Section 4.3) The Project has not specifically stated the foraging ranges that have been used to screen sites in or out for cetaceans or seals, we advise this is provided to ensure the most up to date figures are being used. For cetaceans, we advise that cetacean Management Units (MUs) are used to determine the connectivity to designated sites (further explanation on the use of the MUs is provided in IAMMWG, 2021). For bottlenose dolphin, there is evidence of movement from the Coastal East Scotland MU down the northeast coast of England as far as the Humber Estuary, therefore we consider that this population (and the associated Moray Firth SAC population) should be screened in. For seals, known foraging ranges and telemetry data (most recently updated in Carter et al. 2022) should be used to determine connectivity between the project ZOI and seals travelling outside the boundary of their designated sites. It does not appear that the Project has taken this approach. We consider that the project ZOI is within the known foraging range for the grey seal feature of the Berwickshire and North Northumberland Coast SAC, and the harbour seal feature of the Wash and North Norfolk Coast SAC (Carter et al. 2022). Therefore, these sites should be screened in. For harbour porpoise, the correct reference population has been used. Similarly for the two seal species the NE England and SE England units have been used. For bottlenose dolphins associated with the Moray Firth SAC the MU that should be considered for this reference population is the Coastal East Scotland MU.	Specific foraging ranges for grey and harbour seal have been referenced in section 0. The Moray Firth SAC and associated bottlenose dolphin population have been screened in for further assessment in section 0. The Berwickshire and North Northumberland Coast SAC, and the Wash and North Norfolk Coast SAC have now been screened in for further assessment in section 0. Noted with thanks, the Coastal East Scotland MU has been used as the reference population for bottlenose dolphin.

Comment	Project Response
Marine Mammals Continued Barrier effects due to physical presence have not been screened in– NE previously recommended that this should be screened in (response from scoping report, advice dated 23rd August 22: 'barrier effects from physical presence should be considered further in the context of what is known about animal movements and activities in and around the array areas, such as telemetry data that may show seals transit through the area when foraging, before it is scoped in or out').	Barrier effects due to physical presence have now been screened in for further assessment in section 4.3.2.
Disturbance at seal haul-out sites has not been screened in for any of the development phases however no rationale has been provided for screening it out.	Rationale provided in section 4.3.2.1 for screening out of disturbance at seal haul-out sites.
EMF is not listed here whereas it is listed as being screened in as a direct effect in Table 4-6. We advise that the direct effects of EMF on cetaceans can be screened out, though the indirect effects on prey should be considered.	Direct EMF effects have been screened out of further assessment.
The following is stated within the report 'If suitable underwater noise data is not available for noise levels associated with the underwater noise from the floating operational turbines, then a suitable proxy such as dredging will be used'.	This section of text was incorrect, and has been removed from the report.
The text mentions the Harbour Porpoise North Sea MU is shown in Figure 4-3, but only the grey/harbour seal MUs are shown in this figure	Harbour Porpoise North Sea MU has been added for **Figure 4-3**.
Natural England expect that seal presence in the array area, as well as the export cable corridor, will be characterised in the RIAA.	Noted, seal presence within the array areas will be characterised in the RIAA.
The distance between the project and the Berwickshire and North Northumberland Coast SAC is less than the known foraging ranges of grey seal (see Carter et al., 2022). We consider there to be connectivity between the development and this site therefore it should be screened in. This is consistent with the approach advised to Hornsea 4 OWF.	The Berwickshire and North Northumberland Coast SAC has been screened in for further assessment in section 0.
The distance between the project and the Wash and North Norfolk Coast SAC is less than the known foraging ranges of harbour seal and there is evidence of connectivity between the site and the project (see Carter et al., 2022; but also Sharples et al. 2012 for the larger foraging ranges associated with The Wash population). Furthermore, the applicant acknowledges connectivity to the SE England MU population of harbour seal; the majority of this population are connected to the Wash and North Norfolk Coast SAC.	The Wash and North Norfolk Coast SAC has been screened in for further assessment in section 4.3.4.
Sites designated for marine Ornithological features (Section 4.4) Whilst Natural England are content with the sites screened in and out of the HRA assessment we would like to see more consideration of seabird features outside the breeding season. Distant SPAs screened in should not be limited to those determined solely by the breeding season/foraging ranges of their ornithological features, but also account for the potential for the project to interact with birds from much more distant SPAs during the migration and non-breeding seasons. Furness (2015) provides information for many species of seabird on the suite of colonies that may have connectivity with the southern North Sea outside the breeding season. Natural England recommend that impacts on breeding seabird features outside the breeding season be considered and that details of how they are considered be clearly presented.	We welcome Natural England's confirmation of the sites screened in and out. Section 4.4.4.2 provides consideration of SPAs for non-breeding birds.
Natural England would also like to see greater clarity on which SPA features have been screened in for which SPAs. Both Table 4-10 and 4-11 could be made clearer if the 'species/feature' column listed individual features.	This has now been clarified.

Comment	Project Response
No information has been provided on which impact pathways the relevant SPA features are being screened in for, Natural England therefore cannot comment on this at this stage. Likewise, no detail has been provided on seasonal definitions for different features.	This detail will be provided in the RIAA.
Insufficient detail has been provided on the approach to in-combination assessment for Natural England to be able to comment at this time.	Cumulative and in-combination assessment will follow the approaches taken for recent projects (see section 4.4.4.3)
<u>Sites designated for Terrestrial Ecology (Section 4.5)</u> Natural England welcome the inclusion of Hornsea Mere in this screening document following our advice on the scoping paper in August 2022, and agree that it is outside any ZOI for the construction, operation/maintenance and decommissioning of the Project and can be screened out of further HRA stages. We also agree that Lower Derwent Valley is sufficiently far away from the project to not be impacted. Regarding the Humber Estuary SPA, we acknowledge the rational within the screening document that the built-up nature of the land between the Humber Estuary SPA and the export cable corridor makes it unlikely to be used by protected features. However, no evidence has been provided to support this statement. We therefore recommend that Humber Estuary SPA / RAMSAR remains screened into the HRA assessment and the Project obtain the following information to help undertake a Habitats Regulations Assessment (HRA): • A data search from the local Ecological Data Centre; • Consultation with the Council's Ecologist; • Consultation with local bird groups and other organisations that may hold relevant information; and • A desk-based assessment - using aerial photography, mapping, habitat maps and relevant ecological literature – of the suitability for SPA birds of the habitats present on the proposed site and adjacent fields. If the above desk study identifies that the site or adjacent areas are used by bird features of the Humber Estuary designated sites, we recommend that passage/wintering bird surveys may be required to assess the use of the site as functionally linked land to the estuary. Natural England has generally advised that if ≥1% of a Humber Estuary bird species population could be affected by a proposal, alone or in combination with other plans or projects, then further consideration is required. However, where species are particularly vulnerable due to declines in the Humber population, then it may not be appropriate to rely on the 1% of the estuary population as the critical threshold	Noted regarding the screening out of the Hornsea Mere SPA and Lower Derwent Valley SAC and SPA. The Humber Estuary SPA / Ramsar has been screened in for further assessment in section 4.5.3.

2 Project Description

9. See section 2 of **Volume 6, Report to Inform Appropriate Assessment Habitats Regulations Assessment Part 1 of 4 (application ref: 6.1)** for details regarding the Projects parameters relevant to National Network Sites and this screening report.

3 Habitats Regulations Process

3.1 Legislative Context

10. The Conservation of Habitats and Species Regulations 2017 (2017 No. 1012) (as amended) and The Conservation of Offshore Marine Habitats and Species Regulations 2017 (2017 No. 1013) (as amended) are the principal pieces of secondary legislation which, prior to the UK's departure from the European Union, transposed the terrestrial and offshore marine aspects of the EU Habitats Directive (Council Directive 92/43/EEC) and certain elements of the EU Wild Birds Directive (Directive 2009/147/EC) into the domestic law. Together, these regulations are collectively known as the "Habitats Regulations". The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (2019 No. 579) set out the changes that apply now that the UK has left the European Union. These confirmed that:

- All protected sites and species retain the same level of protection.
- Among other things, the requirement for HRA to be undertaken continues to apply.

11. Unless the UK government implements further legislative changes, the obligations, process and terminology of the Habitats Regulations will, for the purposes of this report, remain as set out in existing legislation and regulations. The role of the European Commission is now taken by UK Ministers.

3.1.1 European Sites (Post EU Exit)

12. The Europe-wide network of nature conservation areas that are the subject of the HRA process was established under the Habitats Directive. The Habitats Directive establishes a network of internationally important sites, designated for their ecological status. For EU member states (and traditionally for the UK), SACs are designated under the Habitats Directive and promote the protection of flora, fauna and habitats. SPAs are designated under the Birds Directive to protect rare, vulnerable and migratory birds. European sites located within an EU Member State combine

to create a Europe-wide network of designated sites (the Natura 2000 network) and may be referred to as Natura 2000 Sites.

13. Following the UKs exit from the EU, European sites located within the UK are no longer part of the Natura 2000 network (nor Natura Sites) but instead combine to form the UK's "National Site Network". Hereafter, sites within the UK and the EU are both referred to as European sites. The National Site Network comprises of European sites in the UK that already existed (i.e., were established under the Nature Directives) on 31 December 2020 (or proposed to the EC before that date) and any new sites designated under the Habitats Regulations under an amended designation process.

14. Note that Ramsar sites are not included within the National Site Network but are still included within the HRA as they remain protected in the same way as SACs and SPAs.

3.2 The HRA Process

15. The HRA process consists of up to three stages that are described in more detail below. For all plans and projects which are not wholly directly connected with, or necessary to the conservation management of a site's qualifying features, this will include formal screening for any LSE either alone or in-combination with other plans or projects. The following is based on the most recent guidance provided by the Department for Environment, Food & Rural Affairs (Defra, 2021).

16. It should be noted that The Crown Estate has conducted a plan-level HRA for all offshore wind sites granted leases in the recent Round 4 leasing round. Within this process two European sites have been assessed as requiring derogation as the effects on their features will lead to an adverse effect on integrity of the sites, these sites are the Dogger Bank SAC and the Flamborough and Filey Coast SPA. This assessment will build upon the plan level HRA but just considering the Projects and any relevant in-combination plans or projects.

3.2.1 Stage 1 – Screening (this report)

17. For all plans and projects which are not wholly, directly connected with or necessary to the conservation management of a site's qualifying features (such as the proposed Projects), Stage 1 Screening is required, as a minimum.

18. In Stage 1, European sites are screened for LSE (either alone or in combination with other plans or projects). Where it can be determined that there is no potential for LSE to occur to qualifying features of a site, that site is sought to be 'screened out'. It is important to note that the burden of

evidence is to show, on the basis of objective information, that there will be no LSE; if the effect may cause LSE, or is not known, this would trigger the need for an Appropriate Assessment (AA).

19. In accordance with the 2018 European Court of Justice ruling in the case of People Over Wind, Peter Sweetman v Coillte Teoranta (C-323/17), mitigation, including embedded mitigation has not been taken into account in State 1 Screening.

20. The classes of designations considered within this HRA Screening are:

- SPAs (some of which are also Ramsar sites);
- pSPA - SPAs that are approved by the UK Government but are still in the process of being classified;
- SACs;
- pSACs - A site which has been identified and approved to go out to formal consultation;
- cSACs - Following consultation on the pSAC, the site is submitted to the European Commission (EC) for designation and at this stage it is called a cSAC; and
- SCI - Once the EC approves the site it becomes a SCI, before the national government then designates it as a SAC.

21. Please note that any remaining cSACs and SCIs within the UK are sites that were adopted by the European Commission before the end of the Transition Period following the UK's exit from the EU.

22. Consideration is also given to effects on Ramsar sites. Ramsar sites protect wetland areas and extend only to "*areas of marine water the depth of which at low tide does not exceed six metres*".

3.2.2 Stage 2 – Appropriate Assessment

23. For those sites where LSE cannot be excluded in Stage 1, further information to inform the assessment is prepared. The assessment will determine whether the project alone or in-combination could adversely affect the integrity of the habitats site in view of its conservation objectives. The assessment and conclusions of this stage will be reported in the form of a report to inform AA and the results of the assessment summarised in the form of a series of matrices.

3.2.3 Stage 3 – HRA Derogation

24. In cases where the competent authority concludes in the AA that an adverse effect on the integrity (AEoI) of a European Site cannot be ruled out beyond reasonable scientific doubt, consent should not be granted unless the project satisfies each of the following tests:

- There are no feasible alternative solutions that would be less damaging or avoid damage to the site;
- The proposal needs to be carried out for imperative reasons of overriding public interest; and
- The necessary compensatory measures can be secured.

25. Without prejudice to the potential findings of the report to inform AA or the conclusions of the Secretary of State's appropriate assessment, RWE Renewables will progress development of information to support HRA derogation during the pre-submission phase, in consultation with the relevant stakeholders.

3.3 Approach to Screening

26. To facilitate the identification of the European sites and features to be considered in the LSE screening for the Projects, a pre-screening of sites has been undertaken.

27. The criteria adopted for the initial identification of European sites are outlined in **Table 3-1**. This approach takes account of the location of the European sites (including Ramsar Sites) in relation to the Projects, the anticipated zone of influence (ZOI) of potential impacts associated with the Projects, and the ecology and distribution of qualifying interest features.

Table 3-1 Criteria for Initial Identification of Relevant European Sites

Criterion	Criterion Definition
1	The site boundaries of the Projects overlap with one or more European or Ramsar site(s).
2	European or Ramsar site(s) with qualifying mobile features/species (e.g. Annex I birds, Annex II marine mammals, migratory fish) whose range (e.g. foraging, migratory, overwintering, breeding or natural habitat range) overlaps with the Projects.
3	European or Ramsar site (s) and/or qualifying interest features located within the potential ZOI of impacts associated with the Projects (e.g. habitat loss/disturbance, noise and risk of collision).

28. The types of effects associated with wind farm development will vary in their magnitude and significance, depending on a range of factors including the type of technology and process involved and the location and timing of activity. In respect of designated habitats and species populations, these effects may be direct (e.g. habitat loss associated with infrastructure installation) or indirect (e.g. via changes in water quality).

29. Screening is based on a conceptual 'source-pathway-receptor' approach:

- Source:
  - The origin of a potential effect (noting that one source may have several pathways and receptors).
  - Example: foundation installation.
- Pathway:
  - The means by which the effect of the activity could impact a receptor.
  - Example: noise from foundation installation such as piling.
- Receptor:
  - The element of the receiving environment that is impacted.
  - Example: marine mammals within range of the noise disturbance.

30. This approach identifies potential effects resulting from the proposed construction, operation & maintenance, and decommissioning of the project.

31. Where there is no pathway, or the pathway has sufficient distance such that the effect from the source has dissipated to a negligible level before reaching the receptor, there may be justification for the screening out of that particular receptor (i.e. feature) for the site in question.

32. Note that sites are screened in if, for any one of their qualifying features (i.e. a species or habitat), a source-pathway-receptor relationship and potential for LSE cannot be ruled out (including in-combination effects). However, each qualifying feature of that site will be considered separately, and it may be that the screening process rules out LSE for some features at this stage.

33. As described above, mitigation is not taken into account at Stage 1, but will be considered where relevant in the Stage 2 assessment.

34. The approach to screening for each receptor is outlined in sections 4.1 to 4.3 and is based on the known distribution, ecology and sensitivities of each receptor group and therefore the potential for being affected by the project.

35. Where there is insufficient information available at this stage to screen out a site, the site is screened in for further consideration

3.3.1 Consideration of In-Combination Effect

36. The Habitats Regulations require that the potential effects of a project on designated sites are considered both alone and in-combination with other plans or projects.

37. Offshore plans or projects that may be considered include (but are not limited to):

- Other offshore wind farms;
- Other renewables developments;
- Aquaculture;
- Aggregate extraction and dredging;
- Licenced disposal sites;
- Shipping and navigation;
- Planned construction of sub-sea cables and pipelines;
- Potential port/harbour development;
- Oil and gas development and operation, including seismic surveys; and
- Unexploded Ordnance (UXO) clearance.
- Carbon capture developments

38. The assessment will present relevant in-combination effects of projects using the tiered approach as detailed in Natural England's *Phase III Best Practice for Data Analysis and Presentation at Examination* guidance note. This approach provides criteria that may be used to indicate the certainty that can be applied to each 'other existing development and/or approved development'. The criteria are assigned in tiers which descend from Tier 1 (most certain) to Tier 7 (least certain) and reflect a diminishing degree of certainty which can be assigned to each development. These tiers are presented in **Table 3-2** below.

Table 3-2 In-Combination Effects Tiered Approach (Natural England, 2022)

Tier Description		
Tier	**Consenting or Construction Stage**	**Data Availability**
Tier 1	Built and operational projects should be included within the cumulative assessment where they have not been included within the environmental characterisation survey, i.e. they were not operational when baseline surveys were undertaken, and/or any residual impact may not have yet fed through to and been captured in estimates of 'baseline' conditions, such as 'background' distribution or mortality rate for birds*.	Pre-construction (and possibly post-construction) survey data from the built project(s) and environmental characterisation survey data from proposed project (including data analysis and interpretation within the ES for the project).
Tier 2	Tier 1 + projects under construction.	As Tier 1 but not including post-construction survey data.
Tier 3	Tier 2 + projects that have been consented (but construction has not yet commenced)	Environmental characterisation survey data from proposed project (including data analysis and interpretation within the ES for the project) and possibly pre-construction survey data from built project.
Tier 4	Tier 3 + projects that have an application submitted to the appropriate regulatory body that have not yet been determined.	Environmental characterisation survey data from proposed project (including data analysis and interpretation within the ES for the project).
Tier 5	Tier 4 + projects that have produced a PEIR and have characterisation data within the public domain.	Environmental characterisation survey data from proposed project (including data analysis and interpretation within the ES for the project) as well as information provided within the PEIR.

Tier Description		
Tier	**Consenting or Construction Stage**	**Data Availability**
Tier 6	Tier 5 + projects that the regulatory body are expecting an application to be submitted for determination (e.g. projects listed under the Planning Inspectorate programme of projects).	Possibly environmental characterisation survey data (but strong likelihood that this data will not be publicly available at this stage).
Tier 7	Tier 6 + projects that have been identified in relevant strategic plans or programmes.	Historic survey data collected for other purposes/by other projects or industries or at a strategic level. See Parker et al. (2022a) for advice on the use of existing datasets.

**Or if there are ongoing impacts that are greater than predicted where there is no evidence that the impacts will dissipate over the lifetime of the project, e.g. displacement of red-throated diver*

39. All plans and projects are included in the HRA Screening. However, those in Tier 5 and onwards will be considered to the extent that the available data allows meaningful consideration, with assessments of plans / projects at these stages likely to be qualitative rather than quantitative.

4 Identification of European Sites and Features and Determination of Likely Significant Effect

4.1 Sites Designated for Annex I Habitats

4.1.1 Approach to Screening

40. Direct or indirect effects on European sites in the North Sea which have benthic habitats (Habitats Directive Annex I) as a qualifying feature have been considered for HRA screening. Potential effects may arise from the permanent or temporary physical presence or activities relating to the construction, operation & maintenance or decommissioning of the Projects.

41. While pathways of effect for individual features are considered, the consideration for the HRA is acknowledged to be for the integrity of an European Site(s) as a whole.

42. This HRA screening exercise considers sites which meet the following criteria:

- A component of the Projects directly overlaps a site whose qualifying features include a habitat; and / or
- The distance between the Projects and the offshore habitat qualifying feature is within the range for which there could be an interaction (i.e. within a ZOI for a physical process change resulting from the Projects).

43. Information on SACs with Annex I habitats features as a qualifying feature are taken from SAC citations/Natura 2000 forms, conservation objectives, and other relevant information as published by the relevant Statutory Nature Conservation Bodies (SNCBs). Distances between the Projects and SAC sites were measured in GIS (the shortest straight-line distance) using shapefiles downloaded from SNCB websites.

4.1.2 Pathways for LSE

44. Within the Projects' offshore area and ZOI, construction activities such as the installation of foundations, cables and ancillary structures, associated seabed preparation works, and the placement of jack-up vessel legs, would cause direct physical disturbance and indirect disturbance through the elevation of suspended sediment.

45. Operation of the Projects would create persistent effects (i.e. for the lifespan of the Projects) or permanent effects (i.e. where infrastructure is not removed during decommissioning), through the loss of existing habitat and introduction of new substrate, such as rock or concrete mattresses used as cable and foundation scour protection as well as the foundation structures

themselves. In addition, there would be persistent indirect disturbance through the elevation of suspended sediment (e.g. from scour).

46. Other temporary effects identified during operation will be caused by maintenance activities such as the use of jack up vessels and the replacement and repair of any cables.

47. Decommissioning effects will be primarily caused by the removal of structures from the seabed. Decommissioning would be expected to cause similar effects to that identified during construction.

48. **Table 4-1** below details the potential effects in relation to the construction, operation & maintenance and decommissioning phases of the Projects. Effect names are based on the standardised pressure names outlined in Natural England's' Phase III Best Practice Advice for Evidence and Data Standards (Natural England, 2022).

Table 4-1: Potential effects identified for Annex I habitats (screened in (✓) and screened out (×))

Potential Effect	Construction	Operation & Maintenance	Decommissioning
Abrasion/disturbance of the substrate on the surface of the seabed	✓	×	✓
Barrier to species movement	Effect not relevant to Annex I habitats		
Changes in suspended solids (water clarity)	✓	×	✓
Electromagnetic changes	×	✓	×
Habitat structure changes – removal of substratum (extraction)	✓	×	×
Hydrocarbon & Polyaromatic Hydrocarbon (PAH) contamination	✓	×	✓
Introduction of other substances (solid, liquid or gas)	Effect not relevant to the Projects' activities		
Introduction or spread of invasive non-indigenous species (INIS)	×	✓	×

Potential Effect	Construction	Operation & Maintenance	Decommissioning
Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion	✓	×	✓
Physical change (to another seabed type)	✓	✓	✓
Physical change (to another sediment type)	✓	✓	✓
Smothering and siltation rate changes (Heavy)	✓	✓	✓
Smothering and siltation rate changes (Light)	✓	✓	✓
Synthetic compound contaminant (including pesticides, antifoulants, pharmaceuticals)	×	✓	×
Transition elements & organo-metal (e.g. TBT) contamination	Effect not relevant to the Projects' activities		
Underwater Noise Changes	×	×	×
Vibration	×	×	×

4.1.2.1 Potential effects during construction

49. The potential effects for Annex I habitats during construction screened in for LSE are:

- Abrasion/disturbance of the substrate on the surface of the seabed;
- Changes in suspended solids (water clarity);
- Habitat structure changes – removal of substratum (extraction);
- Hydrocarbon & Polyaromatic Hydrocarbon (PAH) contamination;

- Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion;
- Physical change (to another seabed type);
- Physical change (to another sediment type):
- Smothering and siltation rate changes (Heavy); and
- Smothering and siltation rate changes (Light).

Abrasion/disturbance of the substrate on the surface of the seabed, changes in suspended solids (water clarity) and penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion;

50. Installation of the turbine foundations and the inter-array / export cables will lead to the disturbance of the underlying substrate. This in turn could lead to the fine sediment of the Dogger Bank SAC entering the water column and leading to a reduction in water clarity. As such, the potential effects associated with abrasion/disturbance of the substrate on the surface of the seabed, changes in suspended solids (water clarity) and penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion are screened in and will be assessed in the HRA.

Habitat structure changes – removal of substratum (extraction)

51. Seabed levelling may potentially be required during scour protection installation. As such, the pressure of habitat structure changes – removal of substratum (extraction) has been screened in and will be assessed in the HRA.

Hydrocarbon & Polyaromatic Hydrocarbon (PAH) contamination

52. Should any potential contaminated sediments be disturbed by construction activities for the Projects, they may be re-suspended in the water column and contaminate the seabed of the Dogger Bank SAC. As such, the pressure of Hydrocarbon & Polyaromatic Hydrocarbon (PAH) contamination has been screened in and will be assessed in the HRA.

Physical change (to another seabed type / to another sediment type)

53. The introduction of novel substrate through the installation of the turbine foundations and the inter-array / export cables will lead to a physical change to the seabed and sediment type of the Dogger Bank SAC. As such, the pressures of physical change (to another seabed type / to another sediment type) have been screened in and will be assessed in the HRA.

Smothering and siltation rate changes (Heavy / Light)

54. Installation of the turbine foundations and trenching activities associated with cable installation could lead to the suspension of fine sediments, which in turn could be deposited on another location within the Dogger Bank SAC. This may result in large deposits of sediment closer to the source of the disturbance ('heavy') or smaller deposits occurring at a further distance ('light'). As such, the pressures of smothering and siltation rate changes (Heavy / Light) have been screened in and will be assessed in the HRA.

4.1.2.2 Potential effects during operation and maintenance

55. The potential effects for Annex I habitats during construction screened in for LSE are:

- Electromagnetic changes;
- Synthetic compound contamination;
- Introduction or spread of invasive non-indigenous species (INIS);
- Physical change (to another seabed type);
- Physical change (to another sediment type);
- Smothering and siltation rate changes (Heavy); and
- Smothering and siltation rate changes (Light).

Electromagnetic changes

56. Electromagnetic field (EMF) emissions from the array and export cables for the Projects could result in impacts on the invertebrate species residing within the Dogger Bank SAC. Current evidence on the impacts associated with EMF on invertebrates are mixed in their conclusions. For example, one recent study by Scott *et al* (2021) finding that the edible crab *Cancer pagarus* displayed clear attraction to 500 microteslas (μt) and above, while another study by Taormina *et al* (2020) found no change in behaviour in European lobster juveniles when exposed to an artificial magnetic field gradient. As the potential for impacts from EMF cannot be ruled out at this stage, the pressure of electromagnetic changes has been scoped in and will be assessed in the HRA.

Synthetic compound contamination

57. There exists the potential for routine maintenance of the paint covering of the wind turbines and foundations to result in 'flakes' of synthetic paint material to enter the water column. It is likely that any emissions would be episodic over the project lifetime and any flakes dispersed by physical processes. However, there is potential for such 'flakes' to contribute to microplastic pollution in the local environment, in addition to being a source

of copper and zinc pollution from the anti-foulant nature of the paints (Gaylarde *et al.* 2021). As this could lead to indirect impacts on marine mammal species via their diet, the potential for synthetic compound contamination will be assessed further within the HRA.

Introduction or spread of invasive non-indigenous species (INIS)

58. The introduction of novel structures to the Dogger Bank SAC and vessels travelling from locations outside of the project area could lead to the introduction or spread of INIS to the Dogger Bank SAC. As such, the pressure of the introduction or spread of INIS has been screened in and will be assessed in the HRA.

Physical change (to another seabed/sediment type)

59. The long-term presence of novel substrate through the installation of the turbine foundations and the inter-array / export cables will lead to a physical change to the seabed and sediment type of the Dogger Bank SAC. As such, the pressures of physical change (to another seabed type / to another sediment type) during the lifetime of the Projects have been screened in and will be assessed in the HRA.

Smothering and siltation rate changes (Heavy / Light)

60. There exists the potential for fine sediment to be disturbed during maintenance activities for the Projects or in the instance of any potential cable reburial activities. Such activities could in turn result in heavy / light smothering of the seabed. As such, the pressures of smothering and siltation rate changes (Heavy / Light) have been screened in and will be assessed in the HRA.

4.1.2.3 Potential effects during decommissioning

61. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude. The potential effects for Annex I habitats during construction screened in for LSE are:

- Abrasion/disturbance of the substrate on the surface of the seabed;
- Changes in suspended solids (water clarity);
- Hydrocarbon & Polyaromatic Hydrocarbon (PAH) contamination;
- Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion;
- Physical change (to another seabed type);
- Physical change (to another sediment type):
- Smothering and siltation rate changes (Heavy); and

- Smothering and siltation rate changes (Light).

62. Decommissioning may require the removal of foundation structures and either the cutting or removal of subsea cables resulting in physical disturbance, potential disturbance and displacement of impacts associated with suspended sediment and underwater noise. Effects caused during decommissioning would be similar to those during the construction phase.

4.1.2.4 In-Combination Effects

63. In-combination effects will consider indirect effects in conjunction with potential impacts to Annex I benthic habitats based on the results of the assessments of other plans and projects. It is anticipated that the effects will be localised, however as above, a highly conservative 90km search area has been used to identify plans and projects for consideration in the HRA.

64. Other projects within the 90km search area are:

- Dogger Bank A offshore wind farm
- Dogger Bank B offshore wind farm
- Sofia offshore wind farm
- Dogger Bank C offshore wind farm
- Dogger Bank D offshore wind farm
- Hornsea 1 offshore wind farm
- Hornsea Project 2 offshore wind farm
- Hornsea Project 3 offshore wind farm
- Hornsea Project 4 offshore wind farm
- Westermost Rough offshore wind farm
- Humber Gateway offshore wind farm
- Eastern Green Link 2 (SEGL2) interconnector
- Third Eastern Link HVDC cable (TGDC)
- Fourth Eastern Link HVDC cable (E4L5)
- Viking Link Interconnector
- National Grid HND Bootstrap Cable Network

65. If details are available for any relevant upcoming decommissioning activities in the oil and gas sector these will also be considered.

66. Existing activities, such as commercial fisheries and aggregate dredging are considered to be a component of the baseline conditions and are therefore not considered in the in-combination assessment.

4.1.3 Identification of Sites and Features

4.1.3.1 Sites directly overlapping with the Projects' boundaries

67. European sites which overlap with the boundaries of the Projects will be taken forward for consideration of LSE. On this basis, the following sites are screened in for determination of LSE:

- Dogger Bank SAC

68. Dogger Bank SAC is designated for the Annex I habitat *Sandbanks which are slightly covered by sea water all the time,* an extensive sublittoral sandbank in the southern North Sea formed by glacial processes and submergence through sea-level rise. A large part of the southern area of the bank is covered by water typically no deeper than 20m below chart datum. The bank is non-vegetated and comprises moderately mobile, clean sandy sediments (JNCC, 2019).

4.1.3.2 Sites within the ZOI of the Projects Effects

69. European sites with qualifying features/species which are located within the potential ZOI of impacts associated with the Projects activities will be taken forward for consideration of LSE. Construction, operation & maintenance and decommissioning activities for the Projects may result in the disturbance of sediment. This can impact receptors at distances far from the source of the disturbance and would be considered the effect with the worst-case ZOI for the project. Based on evidence from other offshore wind EIA's conducted in the UK, such as that of the nearby Dogger Bank C and Sofia (formerly Teesside A & B), sediment disturbance from array area installation activities will be highly localised, with sediment plumes settling rapidly within the water column within 10km of the disturbance origin (Forewind, 2014).

70. In relation to the offshore export cable corridor, other projects in the nearby area (such as Hornsea Project Four) have utilised the tidal ellipse distance to determine the ZoI of sediment dispersion resulting from installation activities in the offshore cable corridor. As site specific data for the Projects is not yet available, in line with other projects in the region a ZoI of 15km has been set for the offshore export cable corridor. This ZoI will be reviewed at Stage 2 of the HRA process, following the availability of site-specific data.

71. On this basis, the Flamborough Head SAC, located approximately 3km north-west of the export cable corridor, has been screened in for further assessment.

72. Flamborough Head SAC is designated for the Annex I habitats *Reefs*, *Vegetated sea cliffs of the Atlantic and Baltic Coasts* and *Submerged or partially submerged sea caves*. Of the designated habitats for the site, those of interest in relation to potential effects from the Projects activities are the areas of reef within the site. The clarity of the relatively unpolluted sea water and the hard nature of the extensive sublittoral chalk habitat have enabled kelp *Laminaria hyperborea* forests to become established in the shallow sublittoral zone. The reefs to the north of the site support a different range of species from those on the slightly softer and more sheltered south side of the headland. The site supports an unusual range of marine species and includes rich animal communities and some species that are at the southern limit of their North Sea distribution, e.g. the northern alga *Ptilota plumosa* (JNCC, 2022a).

73. In addition to sites within the 15km ZOI for sediment dispersion, there exists the potential for any cable protection installed in the nearshore zone to result in changes to nearshore sediment transport processes. This change could result in impacts to the Humber Estuary SAC, designated for the following Annex I habitats:

- Estuaries;
- Mudflats and sandflats not covered by seawater at low tide;
- Sandbanks which are slightly covered by seawater all the time;
- Coastal lagoons; and
- *Salicornia* and other annuals colonising mud and sand Atlantic salt meadows (*Glauco Puccinellietalia maritima*).

74. The Humber Estuary SAC has therefore been screened in for further assessment.

4.1.4 Determination of LSE for Annex I Habitats

75. The potential for LSE would be dependent on the characteristics of the habitats and communities (receptors) present within the footprint of the impact and, in particular, the capacity of the affected communities to recover from those effects identified. **Table 4-2** below provides the list of sites considered.

76. It has not been possible to rule out Likely Significant Effect (LSE) on the Dogger Bank SAC, Flamborough Head SAC or Humber Estuary SAC during stage 1 (screening). As such, information to inform AA will be required for these sites. Site specific benthic survey and consultation with statutory stakeholders, including Natural England will be undertaken to inform this process. See

77. **Figure 4-1** below which details the locations of these sites in relation to the Projects array areas and export cable corridor.

78. As the Projects array areas are located directly within the Dogger Bank SAC, there is potential for its designated features, "*Sandbanks which are slightly covered by sea water all the time*" to be impacted during construction, operation & maintenance or decommissioning of the Projects. In addition, the recent Crown Estate plan level HRA for Round 4 offshore wind farms concluded that that it was unable to conclude that the plan for seabed leasing of an offshore wind farm within the Dogger Bank SAC would not adversely affect the integrity of the site (The Crown Estate, 2022). As such there is exists the potential for LSE to occur to qualifying features of the Dogger Bank SAC.

79. The Projects' export cable corridor routes approximately 3km south-east of the Flamborough Head SAC. However, there exists the potential for the Projects construction, operation & maintenance or decommissioning activities to have indirect impact from suspended sediment being disturbed by such activities upon the Annex I Reef habitat within the SAC. In addition, the *Vegetated sea cliffs of the Atlantic* and *Baltic Coasts* and *Submerged or partially submerged sea caves* features are within the ZOI of sediment disturbance estimated to be approximately 15km. As such there exists a pathway for LSE to occur between the Projects' activities and these features.

80. If external cable protection is installed in the nearshore zone there is potential for this to result in changes to longshore sediment processes southwards of the proposed landfalls, resulting in impacts on the Annex I habitats of the Humber Estuary SAC. This impact would result from the effects of changes in suspended solids (water clarity) and smothering and siltation rate changes (Light) during the operational phases of the Projects. As such there exists a pathway for LSE to occur between the Projects' activities and these features.

4.1.4.1 In-Combination and Transboundary Effects

81. All offshore wind farms under planning, under construction or in operation within the Dogger Bank SAC (Dogger Bank A, B, C, D and Sofia) will be considered in the in-combination assessment, due to the potential in-combination effects upon the Dogger Bank SAC. The Eastern Link 2 HVDC cable, located 2km north of the offshore export cable corridor, in addition to the Third Eastern Link HVDC cable (TGDC) and Fourth Eastern Link HVDC cable (E4L5) will be considered in the in-combination assessment, due to the potential in-combination effects upon the Flamborough Head SAC.

82. As the Hornsea Project One, Two, Three and Four offshore wind farms and Viking Link Interconnector are located at a minimum of 20km from the offshore development area, no in-combination effects are predicted to occur with these projects.

83. Due to the array areas being located approximately 40.8km from the closest European site outside of UK waters (the Doggersbank SAC), no transboundary effects are predicted to occur between the Projects' activities and other European sites outside of UK waters.

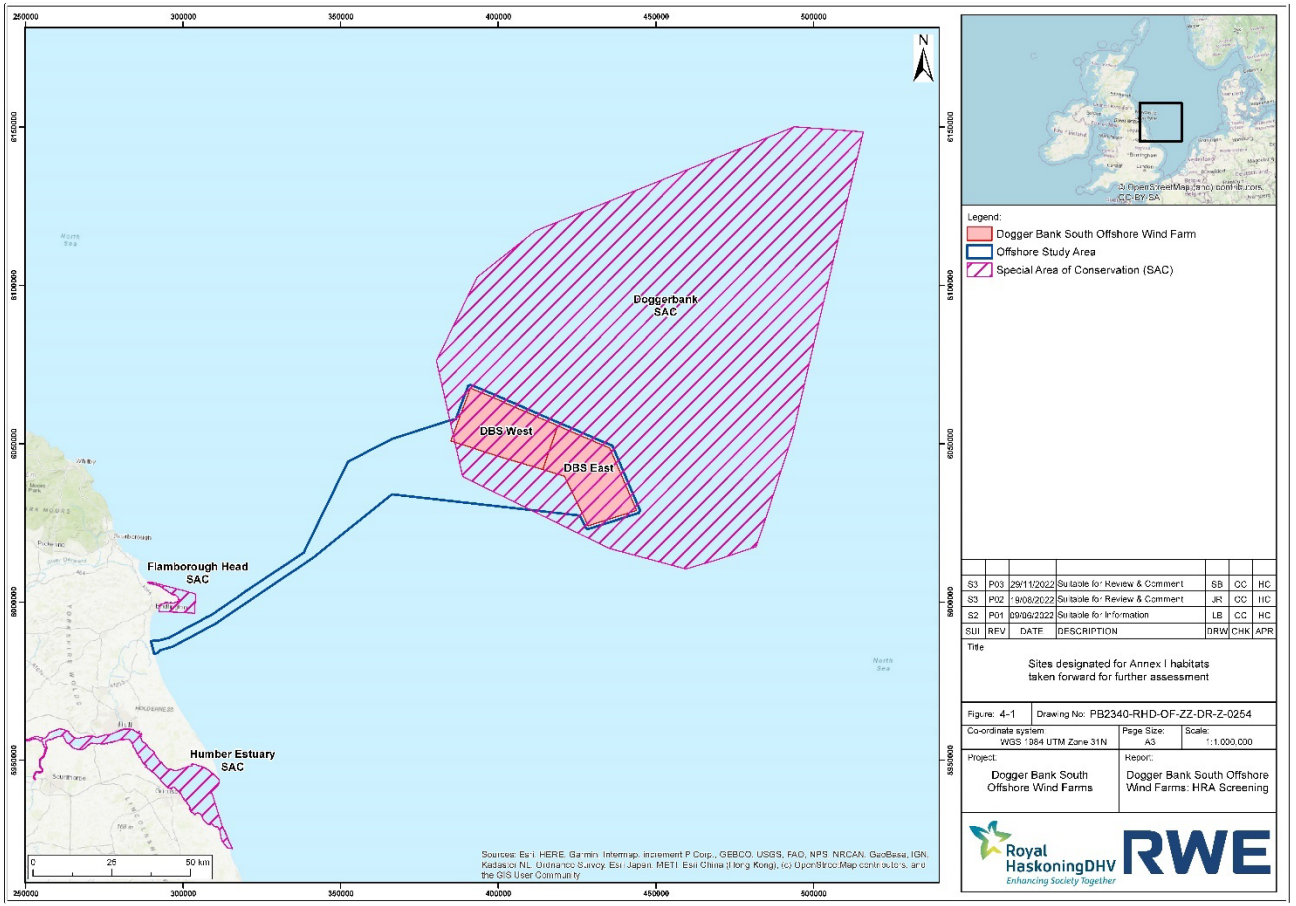

Figure 4-1 Sites designated for Annex I habitats taken forward for further assessment

Table 4-2: Screening of European Sites designated for Annex I Habitats

European Site	Annex I Habitat Features	Distance from the Projects	Screened In/Out	Rationale
Dogger Bank SAC (Site code: UK0030352)	Sandbanks which are slightly covered by sea water all the time	Within array areas	In	Site is directly within the Projects proposed array areas.
Flamborough Head SAC (Site code: UK0013036)	Reefs Vegetated sea cliffs of the Atlantic and Baltic Coasts Submerged or partially submerged sea caves	3km south-east of the offshore export cable corridor	In	Site is within the potential ZOI for sediment disturbance from export cable corridor trenching, operation & maintenance or decommissioning activities.
Humber Estuary SAC (Site code: UK0013036)	Estuaries Mudflats and sandflats not covered by seawater at low tide Sandbanks which are slightly covered by seawater all the time Coastal lagoons Salicornia and other annuals colonising mud and sand Atlantic salt meadows (*Glauco Puccinellietalia maritima*).	44.6km south of the proposed landfall location	In	Habitats could be impacted by any changes to longshore sediment transport in the region resulting from potential cable protection installation in the nearshore zone.

4.2 Sites Designated for Annex II Migratory Fish

4.2.1 Approach to Screening

84. Direct or indirect effects on Annex II migratory fish species may arise from the permanent or temporary physical presence or activities relating to the construction, operation & maintenance or decommissioning of the wind farm and associated infrastructure. Potential effects include loss of habitat, disturbance and displacement.

85. While pathways of effect for individual features are considered, the consideration for the HRA is acknowledged to be for the integrity of a European Site(s) as a whole.

86. This HRA screening exercise considers sites which meet the following criteria:

- The offshore development area directly overlaps a site whose qualifying features includes an Annex II migratory fish species;
- The distance between the offshore development area and a site with a fish qualifying feature is within the range for which there could be an interaction e.g. the distance of the site from the source of suspended sediment from the offshore development area is within the range at which sediment deposition could occur;
- The distance between the offshore development area and resources on which the qualifying feature depends (i.e. an indirect effect acting though prey or access to habitat) is within the range for which there could be an interaction, or the likelihood that a foraging area or a migratory route occurs within the offshore development area.

87. Information on SACs with Annex II migratory fish features as a qualifying feature are taken from SAC citations/Natura 2000 forms, conservation objectives, and other relevant information as published by the relevant SNCBs. Distances between the Project and SAC sites were measured in GIS (the shortest straight-line distance) using shapefiles downloaded from SNCB websites.

4.2.2 Pathways for LSE

88. The key factors that will be considered during the HRA screening process are:

- Potential effects (source); and
- Proximity of source to feature (distance between the Projects and SACs, migration routes) (pathway and receptor).

89. **Table 4-3** below details the potential effects in relation to the construction, operation & maintenance and decommissioning phases of the Projects. Effect names are based on the standardised pressure names outlined in Natural England's' Phase III Best Practice Advice for Evidence and Data Standards (Natural England, 2022).

Table 4-3 Potential effects identified for Annex II migratory fish (screened in (✓) and screened out (×))

Potential Effect	Construction	Operation & Maintenance	Decommissioning
Barrier to species movement	✓	×	✓
Changes in suspended solids (water clarity)	✓	×	✓
Electromagnetic changes	×	✓	×
Physical change (to another seabed type)	✓	✓	✓
Physical change (to another sediment type)	✓	✓	✓
Smothering and siltation rate changes (Heavy)	✓	✓	✓
Smothering and siltation rate changes (Light)	✓	✓	✓
Underwater Noise	✓	×	×

4.2.2.1 Potential effects during construction

90. The potential effects for Annex II migratory fish during construction screened in for LSE are:

- Barrier to species movement;
- Changes in suspended solids (water clarity);
- Physical change (to another seabed type);
- Physical change (to another sediment type);

- Smothering and siltation rate changes (Heavy);
- Smothering and siltation rate changes (Light); and
- Underwater Noise.

91. During construction of the Projects, activities which result in disturbance to the seabed and the generation of suspended sediment have the potential to disturb and displace fish from supporting habitats or migratory routes.

92. Underwater noise generated by construction activities, such as piling and UXO clearance, also have the potential to displace fish from supporting habitats or migratory routes by acting as a barrier. Underwater noise modelling conducted for the Projects has determined that, in the worst case scenario of a multi-leg foundation installed within 24 hours at the western extent of DBS West (the deepest location within the array areas, the Temporary Threshold Shift (TTS) range[1] for stationary fish with a swim bladder would be 48km from the source (see **Volume 7, Appendix 11-3 Underwater Noise Modelling Report (application ref: 7.11.11.3)**). Given that the Projects are 100km from the coast at the nearest point, piling would not affect coastal species. Modelling for UXO clearance activities has determined that, in the worst case scenario of the detonation of a 698kg UXO (plus external donor charge), potential mortal injury to fish with a swim bladder may occur at a distance of 890m, with mortality occurring at a distance of 530m (see **Volume 7, Appendix 11-3 Underwater Noise Modelling Report (application ref: 7.11.11.3)**). Behavioural effects are not expected from UXO clearance as this is effectively an instantaneous event.

4.2.2.2 Potential effects during operation & maintenance

93. The potential effects for Annex II migratory fish during operation & maintenance screened in for LSE are:

- Electromagnetic changes;
- Physical change (to another seabed type);
- Physical change (to another sediment type);
- Smothering and siltation rate changes (Heavy); and
- Smothering and siltation rate changes (Light).

[1] Note that there are no numerical criteria available for behavioural effects on fish from underwater noise, therefore temporary threshold shift (TTS, where a temporary reduction in hearing sensitivity may occur in individual receptors) range is used as a proxy here for behaviour.

94. During the operation & maintenance phase of the Projects, the physical presence of turbine foundations and associated components (offshore platforms, export cables, array cables) will result in the loss or replacement of existing habitats. Maintenance activities during the operational phase may also result in localised disturbance or displacement.

95. No UXO clearance or pile driving will occur at the operation & maintenance stage of the Projects. The only sources of underwater noise at this stage arising from vessel movements related to intermittent maintenance activities and operational turbines. Underwater noise modelling shows that impact ranges for these activities are highly localised (<50m) (see **Volume 7, Appendix 11-3 Underwater Noise Modelling Report (application ref: 7.11.11.3)**). As such, underwater noise effects during the operational phase of the Projects have been screened out of further assessment.

4.2.2.3 Potential effects during decommissioning

96. Impacts during decommissioning are expected to be similar in nature to those anticipated during construction, but of smaller magnitude. The potential effects for Annex I habitats during construction screened in for LSE are:

- Barrier to species movement;
- Changes in suspended solids (water clarity);
- Physical change (to another seabed type);
- Physical change (to another sediment type);
- Smothering and siltation rate changes (Heavy); and
- Smothering and siltation rate changes (Light).

97. Decommissioning may require the removal of foundation structures and either the cutting or removal of subsea cables resulting in physical disturbance, potential disturbance and displacement of impacts associated with increases in suspended sediment. Effects caused during decommissioning would be similar to those during the construction phase.

98. As with the operation & maintenance phase of the Projects, no UXO clearance or pile driving will occur at the decommissioning stage of the Projects. As such, underwater noise effects during the operational stage of the Projects have been screened out of further assessment.

4.2.3 Identification of Sites and Features

4.2.3.1 Sites directly overlapping with the Projects boundaries

99. European sites which overlap with the boundaries of the Projects will be taken forward for consideration of LSE. There are no European sites which

meet this criterion for Annex II migratory fish and so no sites are screened in for further consideration on this basis.

4.2.3.2 Sites within the ZOI of the Projects effects

100. European sites with qualifying mobile features/species which are located within the potential ZOI of impacts associated with the Projects and will be taken forward for consideration of LSE. As detailed in section 4.1.3.2 above, sediment disturbance will be highly localised, with sediment plumes settling rapidly within the water column within 10 kilometres of the disturbance origin. Modelling conducted for other offshore wind farm EIAs, such as Dogger Bank C and Sofia, indicates that the maximum distance at which moderate avoidance behaviour would occur from piling activities was 19km. However, as a conservative estimate all sites with fish qualifying features within 50km of construction activities for the Projects have been screened in for further assessment. On this basis, the following sites are screened in for determination of LSE (see

101. **Figure 4-2** below detailing the location of this site):

- Humber Estuary SAC – Sea lamprey *Petromyzon marinus* and river lamprey *Lampetra fluviatilis* (present as a qualifying feature, but not a primary reason for site selection)

4.2.3.3 Sites containing species whose range overlaps with the Projects effects

102. Based on a review of available information the following Annex II species are known to either migrate through or spend part of their lifecycle in the North Sea; Atlantic salmon *Salmo salar*, allis shad *Alosa alosa*, twaite shad *Alosa fallax* and sea lamprey. In addition, River lamprey is found in the North Sea but is restricted to coastal waters (Canal & River Trust, 2022). To provide for a highly conservative screening process, with consideration of potential in-combination interactions, all sites designated for such species on the east-coast of England have been considered. On this basis, the following sites are screened in for determination of LSE (see

103. **Figure 4-2** below detailing the location of this site):

- River Derwent SAC – River lamprey (primary reason for selection of this site) and sea lamprey (present as a qualifying feature, but not a primary reason for site selection).

104. It should be noted that some sites on the east coast of England contain Annex II migratory fish species that are of 'D' grade, meaning that the species is present within the site but in non-significant presence (JNCC, 2022b). These are non-qualifying species and as such are not included

within a site's conservation objectives. Therefore such sites have not been considered in this report.

4.2.4 Determination of LSE for Annex II Migratory Fish

105. Disturbance to supporting habitats due to installation of infrastructure or due to temporary works will be localised within the offshore development area. Sediment plumes and changes to seabed characteristics are expected to be restricted to the vicinity of the offshore development area.

106. Underwater noise, particularly from piling activity may have behavioural effects on 10's of kilometres from the noises source, and thus could affect a wide area. The Humber Estuary SAC is located approximately 44km south of the export cable corridor at its closest point, and approximately 142km south-west of the Projects array areas at its closest point. As detailed in section 4.2.2.1 above, the largest TTS for stationary fish with swim bladders (the worst-case scenario for disturbance)[2] is 48km from the piling source. As such, the Projects activities will not have a direct effect on the fish within the Humber Estuary SAC itself. Given that both river and sea lamprey are river/coastal dwelling species (JNCC, 2022b, 2023b) and the Projects are 100km from the coast, there exists no pathway for LSE between piling activities for the Projects and the features of the Humber Estuary SAC or River Derwent SAC.

107. As specific surveys to identify potential locations of UXO will not be undertaken until the DCO is granted, it is not yet known if UXO clearance will be required along the offshore export cable corridor. As such, the potential for UXO clearance to occur in coastal waters cannot be ruled out at this stage of the assessment (although the impact range would be <1km (see Section 4.2.2.1). Therefore, there exists a pathway for LSE to occur between UXO clearance activities for the Projects and the features of the Humber Estuary SAC and River Derwent SAC in coastal waters outwith the SACs.

108. **Table 4-4** below presents the findings of the HRA screening exercise with justification for scoping individual sites in.

[2] Note that lamprey do not have swim bladders and will have lower sensitivity than this works case (see **Volume 7, Appendix 11-3 Underwater Noise Modelling Report (application ref: 7.11.11.3)**)

Table 4-4 Screening of European Sites designated for Annex II Migratory Fish

European Site	Annex II Migratory Fish Features	Distance from the Projects	Screened In/Out	Rationale
River Derwent SAC (Site code: UK0030253)	**Annex II species that are a primary reason for selection of this site** River lamprey **Annex II species present as a qualifying feature, but not a primary reason for site selection** Sea lamprey	43km west of the landfall site (inland)	In	Individuals from the site may be disturbed/subject to mortality by potential UXO clearance in coastal waters.
Humber Estuary SAC (Site code: UK0030170)	**Annex II species present as a qualifying feature, but not a primary reason for site selection** Sea lamprey River lamprey	44km south of the export cable corridor	In	Individuals from the site may be disturbed/subject to mortality by potential UXO clearance in coastal waters.

4.2.4.1 In-Combination Effects

109. Due to the presence of several other offshore wind farms currently in the planning / pre-construction phase of their lifespans in the vicinity of the Projects, their exists the potential for underwater noise changes from these Projects to result in an in-combination effect on the Annex II Migratory Fish features of the Humber Estuary SAC and River Derwent SAC. Such impacts will be explored further in the next stage of the assessment.

4.2.4.2 Transboundary Effects

110. **Table 4-5** below details the closest distances between the Project's array areas and export cable corridor and those of the nearest SAC's designated for Annex II Migratory Fish. Given the large distances to designated sites and the location of the proposed project away from coastal waters it is considered that there would be no pathway for any significant transboundary impact upon migratory fish.

Table 4-5 The distance between the proposed Project's array areas and export cable corridor and closest point of the boundary of the nearest SAC

Annex II Migratory Fish Species	SAC	Distance (km)
Atlantic salmon	Vlakte van der Raan SCI	324
Sea Lamprey	Noordzeekustzone SAC	216
River Lamprey		
Allis Shad		
Twaite Shad		

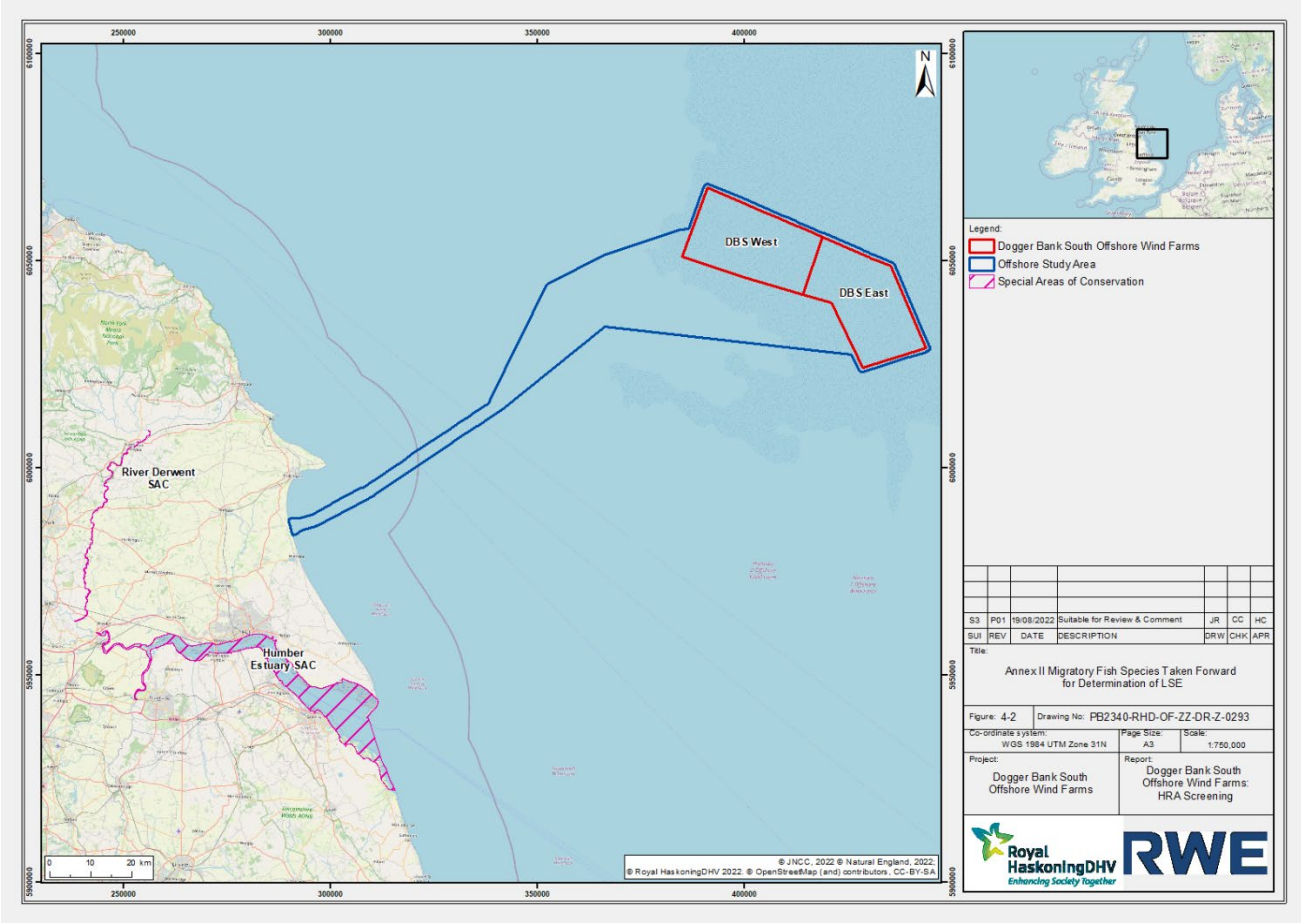

Figure 4-2 SACs for Annex II Migratory Fish taken forward for determination of LSE

4.3 Sites Designated for Annex II Marine Mammals

4.3.1 Approach to Screening

111. For marine mammals, the approach to HRA screening primarily focuses on the potential for connectivity between individual marine mammals from designated populations and the offshore project area (i.e. demonstration of a clear source-pathway-receptor relationship). This is based on the distance of the Projects from the designated site(s), the range of each effect, and the potential for marine mammals from a designated site to be within range of an effect.

112. The HRA screening exercise therefore considers designated sites which meet the following criteria:

- The distance between the potential effect of the proposed Project and a designated site with marine mammals as a qualifying feature is within the range for which there could be an interaction (for example, the pathway is not too long for significant noise propagation and therefore the site is within the (ZOI) for underwater noise effects).
- The distance between the proposed Project and resources on which the qualifying marine mammal feature depends (i.e. an indirect effect acting though prey or access to habitat) is within the potential ZOI (for example the pathway is not too long).
- The likelihood that a foraging area or a migratory route occurs within the ZOI of the proposed Project (applies to mobile interest features when outside the designated site).

113. Designated sites that did not meet these criteria have been screened out from further assessment.

114. This HRA screening considers any designated sites within the harbour porpoise North Sea MU, where the species is considered as a grade A, B or C feature. Grade D indicates a non-significant population and have therefore not been considered further.

115. The approach taken was informed by HRA screening reports for offshore wind farms recently submitted to the Planning Inspectorate (principally North Falls, Dudgeon and Sheringham Shoal Extensions, East Anglia ONE North and East Anglia TWO), along with corresponding stakeholder feedback.

116. Assessment of species-specific risk to potential effects of offshore wind farms is informed by industry standard advice and guidance, relevant

scientific papers, and representations from both applicants and stakeholders during DCO examinations for offshore wind farms.

117. Information on SACs with marine mammals as a qualifying feature is taken from SAC citations/Natura 2000 forms, conservation objectives, and other relevant information as published by the relevant SNCBs. Advice on operations for Marine Protected Areas were not considered necessary for screening but will be referred to as required for appropriate assessment. Distances between the Project and SAC sites were measured in GIS (the shortest straight-line distance) using shapefiles downloaded from SNCB websites.

4.3.2 Pathways for LSE

118. Direct or indirect effects to marine mammals may arise from permanent or temporary physical presence of the project and / or activities relating to the construction, operation & maintenance or decommissioning of the Project and associated offshore infrastructure. Potential effects include indirect effects, for example through impacts on prey species, and direct effects, for example from underwater noise and vessel interactions.

119. The key factors considered during the HRA screening process are:

- Potential effects (source); and
- Proximity of source to feature (i.e. the distance between the potential effects and marine mammals from designated sites) (pathway and receptor).

4.3.2.1 Potential effects considered in screening

120. The potential effects during the construction, operation & maintenance and decommissioning phases are outlined below, and summarised in **Table 4-6**.

Table 4-6 Summary of potential effects to marine mammals screened into HRA

Potential Effects	Construction	Operation & Maintenance	Decommissioning
Physical or auditory injury resulting from underwater noise	✓	✓	✓
Behavioural impacts resulting from underwater noise	✓	✓	✓
Disturbance from vessels due to presence and underwater noise	✓	✓	✓

Potential Effects	Construction	Operation & Maintenance	Decommissioning
Barrier effects from underwater noise	✓	✓	✓
Vessel interaction (increase in risk of collision)	✓	✓	✓
Disturbance at seal haul-out sites	×	×	×
Disturbance to seals foraging at sea	✓	✓	✓
Barrier effects due to the physical presence of offshore infrastructure	×	✓	×
Changes in water quality	×	×	×
Changes to prey availability	✓	✓	✓
EMF (direct effects)	×	×	×

121. Disturbance at seal haul-out sites has been screened out of further assessment for the HRA, with the closest designated haul-out site (Filey Brigg) located 25km from the offshore export cable corridor. The haul-out site is referred to as a 'transient resting spot for seals' with a maximum of 15 individual recorded at any one time, and harbour seal counts in single numbers (Filey Bird Observatory Group, 2023).

122. Studies indicate that for grey seal, vessels travelling within 300m of a haul-out site, a grey seal may flee into water, but significant disturbance would be expected at a distance of less than 150m. For harbour seal, if a vessel travels within 600m of a haul-out site, there is the potential for a flee response, and if a vessel is within 300m, a significant number of harbour seal would flee (Jansen *et al.*, 2010).

123. Given the distance of the Projects activities from the nearest haul-out site, and that vessel movements to DBS East and DBS West from the chosen construction port(s) would use direct established routes and are unlikely to

be close to the shore, the potential for any increase in disturbance to seal haul-out sites as a result of the Projects is negligible.

4.3.2.2 Potential effects during construction

124. The potential effects for marine mammals during construction that are screened in for LSE are:

- Underwater noise;
- Vessel interaction; and
- Changes to prey resources.

Underwater noise

125. The key potential effects during construction for marine mammals are expected to be those from underwater noise, which has the potential for the following effects:

- Physical injury;
- Permanent auditory injury / permanent loss of hearing sensitivity (Permanent Threshold Shift (PTS));
- Temporary auditory injury / temporary loss in hearing sensitivity (Temporary Threshold Shift (TTS));
- Disturbance and behavioural effects;
- Effects on prey species;
- Disturbance to seals foraging at sea; and
- Barrier effects.

126. Activities that have the potential to generate underwater noise associated with the construction of the Project are:

- Pre-construction geophysical surveys;
- Clearance of UXO, if required, at the Project site and along the cable route;
- Piling of the foundations for the offshore substation;
- Installation of foundations (depending on method used) for the wind turbines;
- Other construction activities such as seabed preparation, cable laying and rock placement; and
- Vessels.

127. Site specific underwater noise modelling will be undertaken for all potential noise sources that could affect marine mammals.

128. The potential effects associated with underwater noise are screened in and will be assessed in the HRA, taking into account the most recent and robust research, guidance and information available.

Vessel Interaction

129. Despite the potential for marine mammals to detect and avoid vessels, ship strikes are known to occur (Wilson *et al.* 2007). An increase in vessels could potentially lead to an increase in vessel collision risk. Therefore, the potential for interactions / an increase in collision risk with construction vessels during the construction phase is also screened in for LSE.

130. The increased risk of collision with marine mammals will be assessed further in the HRA.

Changes to Prey Availability

131. The potential effects on fish species and therefore the prey resource for marine mammals during construction can result from:

- Physical disturbance and temporary habitat loss of seabed habitat, spawning or nursery grounds or migration;
- Permanent habitat loss;
- Increased suspended sediments and sediment re-deposition;
- Re-mobilisation of contaminated sediment;
- Underwater noise effects to hearing sensitive species during pile driving and other activities (vessels, seabed preparation, cable installation etc);
- Introduction of anchors, foundations, scour protection and hard substrate and associated fish aggregation; and,
- Cumulative effects from underwater noise, permanent habitat loss, and changes to seabed habitat.

132. Therefore, the potential for any changes to the prey resource for marine mammals during construction will be assessed further in the HRA.

4.3.2.3 Potential effects during operation & maintenance

133. The potential effects for marine mammals during operation & maintenance (O&M) with the potential for LSE:

- Underwater noise;
- Vessel interaction;
- Barrier effects due to the physical presence of offshore infrastructure; and
- Changes to prey resources.

Underwater Noise

134. Potential sources of underwater noise during the operation & maintenance phase include:

- Operational noise from wind turbines;
- Maintenance activities, such as cable re-burial and any additional rock placement; and
- Operation & maintenance vessel activity.

135. The potential for disturbance from underwater noise during the operation & maintenance phase will be based on the underwater noise modelling and assessment of similar activities for the construction phase.

136. The potential effects associated with underwater noise during operation & maintenance (including PTS, TTS, disturbance and behavioural effects, effects on prey species and barrier effects) have the potential for LSE, and will be considered further in the HRA.

Vessel Interactions

137. It is anticipated that the effects associated with vessel activities during operation & maintenance would be similar to, or less than those during the construction phase, due to the presence of a lower number of vessels. Therefore, as outlined for construction, the increased risk of collision with marine mammals will be given further consideration in the HRA, as there is the potential for LSE.

Barrier effects due to the physical presence of offshore infrastructure

138. Given the potential presence of grey seals within the array areas, as detailed in data from Carter et al. 2022, there exists the potential for barrier effects to occur from the physical presence of the turbines and offshore platforms constructed for the Projects. As such, there exists the potential for LSE, and this effect will be considered further in the HRA.

Changes to Prey Availability

139. There is the potential for LSE to marine mammal species, as a result of effects on prey species. The potential effects on fish species (therefore the prey resource for marine mammals) during operation & maintenance can result from:

- Permanent loss of habitat;
- Introduction of hard substrate;
- Underwater noise;
- Maintenance activities; and,

- EMF.

140. The potential for any changes to the prey resource for marine mammals during operation & maintenance will be assessed further in the HRA.

4.3.2.4 Potential effects during decommissioning

141. It is anticipated that the decommissioning effects would be similar in nature to those of construction, although the magnitude of effect is likely to be lower depending on the method used during decommissioning.

142. Potential effects during decommissioning screened in for further assessment include:

- Physical and auditory injury and behavioural effects resulting from underwater noise;
- Disturbance from vessels and barrier effects due to underwater noise;
- Disturbance to marine mammals foraging at sea;
- Increase in risk of collision due to vessel interaction; and,
- Changes to prey resource.

4.3.2.5 In-combination effects

143. The in-combination assessment will identify where the predicted effects of the construction, operation & maintenance and decommissioning of the Project could interact with effects from different activities, plans or projects within the same region and affect marine mammals.

144. The types of plans and projects to be taken into consideration are as listed in section 3.3.1. Screening of the plans and projects will be considered based on the following key points:

- They are located in the relevant marine mammal Management Unit (MU); and,
- There is the potential for cumulative effects during the construction, operational or decommissioning of the proposed Project.

145. The marine mammal in-combination assessment will consider projects, plans and activities which have sufficient information available to undertake the assessment, and will include the potential effects of:

- Underwater noise
- Vessel interaction
- Changes to prey resources (including habitat loss)

4.3.2.6 Transboundary effects

146. There is a significant level of marine development being undertaken or planned in the North Sea. Populations of marine mammals are highly mobile and there is potential for transboundary effects especially when considering underwater noise impacts.

147. Transboundary effects will be assessed, where possible, in consultation with developers in other Member States to obtain up to date project information to feed into the assessment.

148. The potential for transboundary effects will be addressed by considering the reference populations (MUs) and potential linkages to international designated sites as identified through telemetry studies for seals and ranges and movements of cetacean species.

149. The assessment of the effect on the integrity of the transboundary European sites as a result of effects on the designated marine mammal populations will be undertaken and presented in the information for the HRA.

150. Transboundary effects will also be considered within the in-combination assessment.

4.3.3 Identification of Sites and Features

151. The following section details the process taken to identify the designated sites with relevant Annex II marine mammals to be taken forward for detailed determination of LSE.

152. The approach adopted for this HRA screening report focuses on the Annex II marine mammal features for which there is considered to be a potential for impact as a result of the Projects. While pathways of effect for individual features are considered, the consideration for the HRA is acknowledged to be for the integrity of a designated site(s) as a whole.

153. HRA screening for marine mammals considers designated sites and potential in-combination effects within the relevant areas for each species. These are:

- Harbour porpoise *Phocoena phocoena* – North Sea MU (**Plate 4-1**);
- Grey seal *Halichoerus grypus*– north-east (NE) England and south-east (SE) England MUs **(Plate 4-2**) and wider North Sea area;
- Harbour seal *Phoca vitulina* - NE England and SE England MUs (**Plate 4-2**) and wider North Sea area; and
- Bottlenose dolphin *Tursiops truncatus* – Coastal East Scotland MU and wider North Sea area (**Plate 4-3**).

154. **Table 4-7** provides the screening assessment for all designated sites, with either harbour porpoise, grey seal, harbour seal and bottlenose dolphin listed as a qualifying feature within the relevant screening areas.

4.3.3.1 Harbour Porpoise

155. The Projects array areas, and part of the export cable corridor, are within the summer area of the Southern North Sea SAC, which is designated for harbour porpoise. The offshore export cable corridor is also located approximately 14.1km north-west of the winter area for the Southern North Sea SAC harbour porpoise population.

156. There is also potential connectivity for harbour porpoise from the Doggerbank SAC and Klaverbank SAC.

157. Harbour porpoise within the eastern North Atlantic are generally considered to be part of a continuous biological population that extends from the French coastline of the Bay of Biscay to northern Norway and Iceland (Inter-Agency Marine Mammal Working Group (IAMMWG) 2022). However, for conservation and management purposes, it is necessary to consider this population as smaller MUs.

158. The Project areas are located in the North Sea MU, which has an estimated harbour porpoise abundance of 346,601 (IAMMWG, 2022).

159. The Southern North Sea SAC, Doggerbank SAC and Klaverbank SAC are all within the North Sea MU for harbour porpoise. Assessments will be undertaken against the Southern North Sea SAC. It is assumed all harbour porpoise in and around the Projects would be from the nearest SAC, which is the Southern North Sea SAC.

160. JNCC and Natural England (2019) consider it is not appropriate to use current Southern North Sea SAC site population estimates in any assessments of effects of plans or projects on the site (i.e. HRA), as they need to take into consideration population estimates at the MU level, to account for daily and seasonal movements of the animals. Therefore, assessments will be put into the context of the North Sea MU.

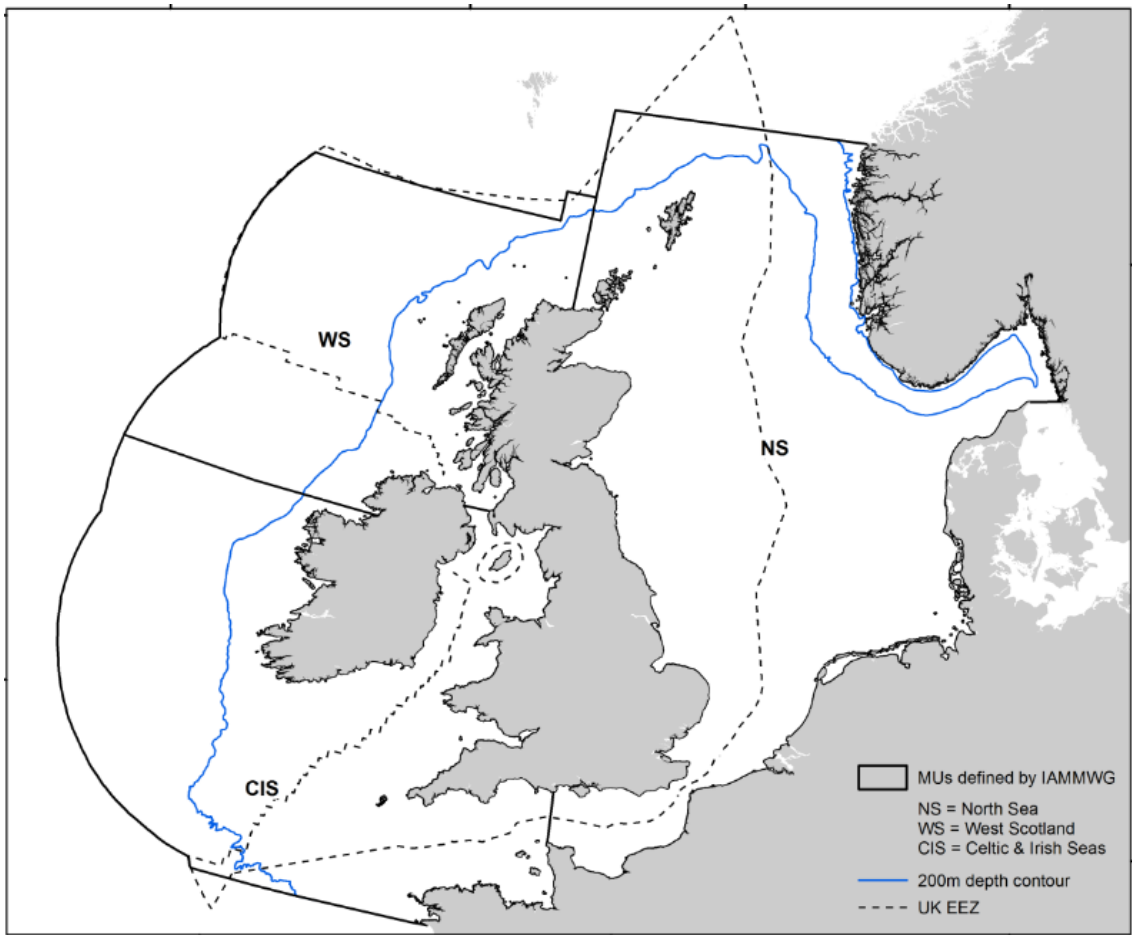

Plate 4-1 MU for harbour porpoise (North Sea MU) (IAMMWG, 2022)

4.3.3.2 Grey Seal and Harbour Seal

161. Both grey seal and harbour seal are present in the export cable corridor. For grey seal, densities within the export cable corridor are relatively low in most areas offshore, with increased densities near to the southern and western edges of Dogger Bank, and higher closer to the coastline, particularly south of Hornsea, with an area of relatively high grey seal density within 5km of the export cable corridor (Carter *et al.* 2020). Harbour seal densities are low in the majority of the export cable corridor (Carter *et al.* 2020). Grey seal are known to forage far from their point of origin, up to 448km, with harbour seal travelling a lesser distance of up to 273km (Carter et al., 2022).

162. Designated sites screened in for grey seal are the Humber Estuary SAC, Berwickshire and North Northumberland Coast SAC and Klaverbank SAC.

163. Donna Nook is located in the Humber Estuary SAC, which is the largest grey seal breeding site in England, and one of the biggest in the UK. Donna Nook is located 60km to the south of the possible landfall locations (SCOS 2020).

164. The Berwickshire and North Northumberland Coast SAC is located approximately 173km north-west of the Projects offshore export cable corridor. Recent data on grey seal distribution from the Berwickshire and North Northumberland Coast SAC (Carter et al., 2022) indicates that the individuals from the site may be foraging within/in the vicinity of the offshore development area. As such, this evidence indicates the potential for connectivity for grey seals between the SAC and the offshore development area.

165. Designated sites screened in for harbour seal are the Wash and North Norfolk Coast SAC and Klaverbank SAC.

166. The Wash and North Norfolk Coast SAC is located approximately 103km south of the offshore export cable corridor. Recent data on harbour seal distribution from the Berwickshire and North Northumberland Coast SAC (Carter et al., 2022) indicates that the individuals from the site may be foraging within/in the vicinity of the offshore export cable corridor, specifically around the landfall area. As such, this evidence indicates the potential for connectivity for harbour seals between the SAC and the offshore export cable corridor.

167. Other designated sites where grey and or harbour seal are a qualifying feature have been screened out due to distances from potential impacts and lack of connectivity.

168. The NE England and SE England MUs for grey and harbour seals will be used to determine the wider reference population and areas for potential in-combination effects (**Plate 4-2**). The latest SCOS report, other relevant seal counts and Carter *et al.* (2022) will be used to determine abundance estimates for these areas. Assessments will be based on the latest grey and harbour seal counts for the relevant SACs.

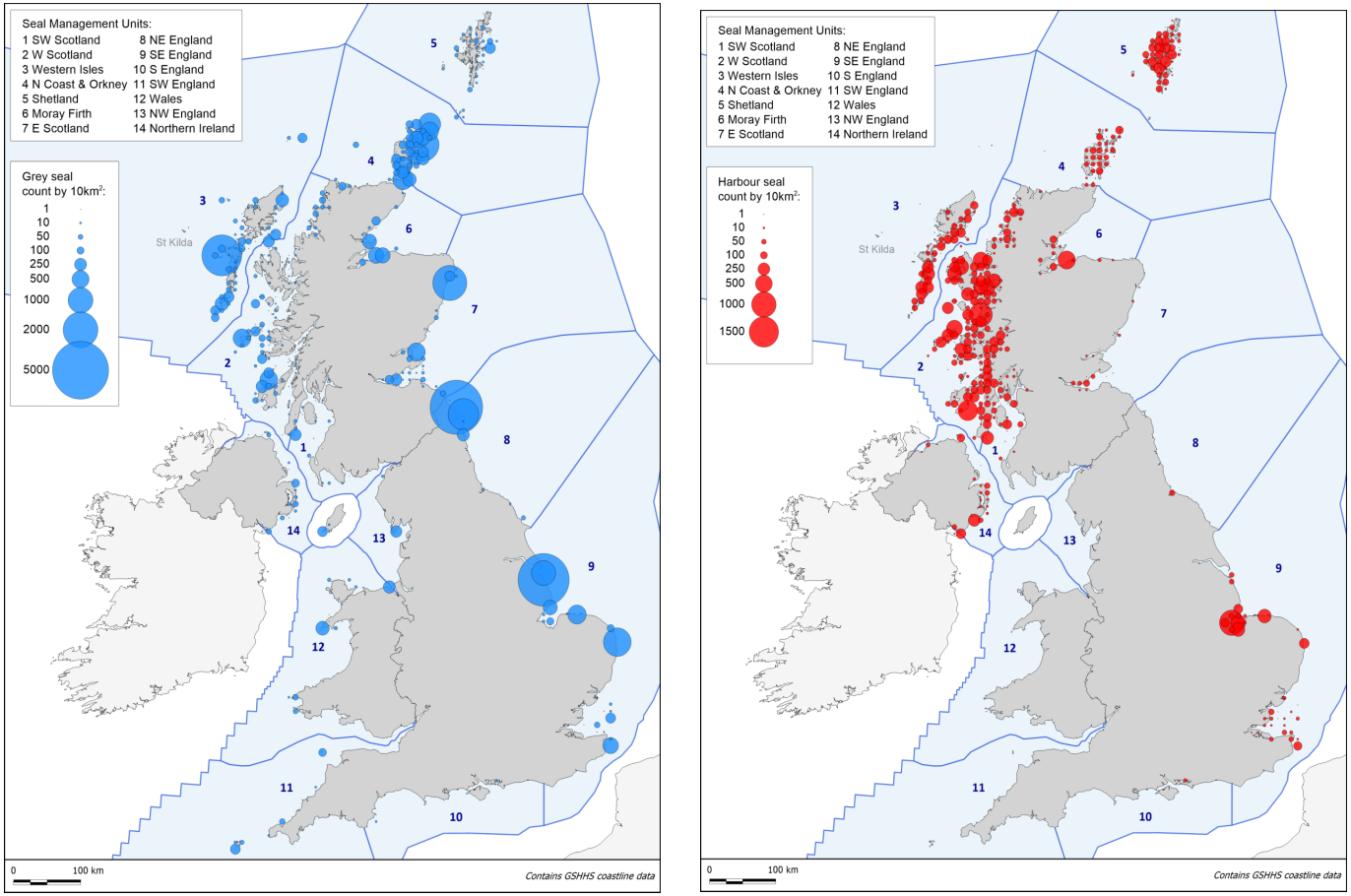

Plate 4-2 Grey seal (left) and harbour seal (right) MUs (and haul-out site counts) (SCOS, 2020)

4.3.3.3 Bottlenose dolphin

169. No element of the offshore development area overlaps with any sites designated for the protection of bottlenose dolphin.

170. However, there is evidence that individuals from the Moray Firth (and associated Moray Firth SAC, located approximately 440km north of the Projects) are travelling further south to the Yorkshire coast (World Cetacean Alliance, 2022). As this bottlenose dolphin population is typically found closer inshore, there exists the potential for the species to be impacted by the Projects activities.

171. The Moray Firth SAC supports the only known resident population of bottlenose dolphin in the North Sea. The population is estimated to be around 130 individuals, with individuals being present within the site year-round (JNCC, 2023a).

172. As no evidence exists of connectivity with other bottlenose dolphin populations in the Greater North Sea MU, the Coastal East Scotland MU will be used to determine the wider reference population and areas for potential in-combination effects (see **Plate 4-3**).

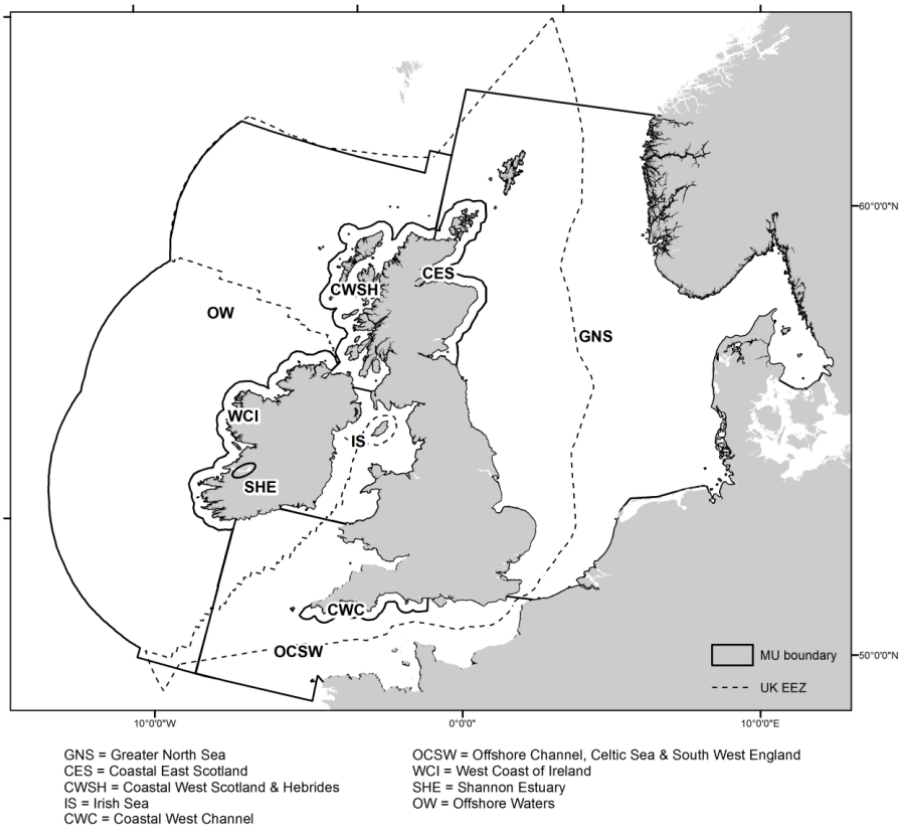

Plate 4-3 Bottlenose Dolphin MU (JNCC, 2015)

4.3.4 Determination of LSE for Annex II Marine Mammals

173. For harbour porpoise, grey seal, harbour seal and bottlenose dolphin, a number of potential effects (section 4.3.2) have been screened in for further assessment, to determine the potential for any adverse effects on the integrity of the designated sites screened.

174. Determination of LSE for Annex II marine mammals will be in relation to the conservation objectives for the SAC, taking into account the number of individuals that could be affected in relation to the relevant MU. The potential for LSE will also consider the Conservation Status of the species.

175. Determination of LSE will also be based on any direct impacts on the SACs, including area that could be affected in relation to the area of the SAC.

176. **Table 4-7** provides the screening assessment for all designated sites, with either harbour porpoise, grey seal, harbour seal or bottlenose dolphin listed as a qualifying feature within the screening area.

Table 4-7 Screening of National Site Network Sites for marine mammal features

Designated Site	Country	Qualifying Species	Distance to closest point of project (km)	Screened In / Out	Rationale
Berwickshire & North Northumberland Coast SAC UK0017072	England	Grey Seal	173km	In	Potential for connectivity. It is assumed that grey seal in the Project area, or areas of potential effect, could also have connectivity to the Project.
Southern North Sea SAC UK0030395	England	Harbour Porpoise	Projects boundaries within site	In	This site is within the AoS of the Projects, and will therefore be considered further in the HRA assessments.
Humber Estuary SAC UK0030170	England	Grey Seal	Projects boundaries within site (export cable corridor)	In	This site is within the AoS of the Projects, and will therefore be considered further in the HRA assessments.
The Wash and North Norfolk Coast SAC UK0017075	England	Harbour Seal	103 km	In	Potential for connectivity. It is assumed that harbour seal in the Project area, or areas of potential effect, could also have connectivity to the Project.
Gule Rev SAC DK00VA259	Denmark	Harbour porpoise	475 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
Skagens Gren og Skagerrak SAC	Denmark	Harbour porpoise	606 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
Store Rev SAC	Denmark	Harbour porpoise	575 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
Sydlige Nordsø SAC	Denmark	Harbour porpoise	328 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
		Harbour seal			
		Grey Seal			
Vadehavet med Ribe Å, Tved Å og Varde Å vest for Varde SAC	Denmark	Harbour porpoise	396 km	Out	
		Harbour seal			

Designated Site	Country	Qualifying Species	Distance to closest point of project (km)	Screened In / Out	Rationale
		Grey Seal			The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
Baie de Canche et couloir des trois estuaires SAC	France	Harbour porpoise	421 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
		Grey seal			
		Harbour seal			
Baie de Seine occidentale SAC	France	Harbour porpoise	539 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
		Harbour seal			
Baie de Seine orientale SAC	France	Harbour porpoise	539 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
		Harbour seal			
Bancs des Flandres SAC	France	Harbour porpoise	328 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
		Harbour seal			
		Grey Seal			
Falaises du Cran aux Oeufs et du Cap Gris-Nez, Dunes du Chatelet, Marais de Tardinghen et Dunes de Wissant SAC	France	Harbour porpoise	363 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
		Harbour seal			
		Grey Seal			
Recifs Gris-Nez Blanc-Nez SAC	France	Harbour porpoise	350 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
		Harbour seal			
		Grey Seal			

Designated Site	Country	Qualifying Species	Distance to closest point of project (km)	Screened In / Out	Rationale
Ridens et dunes hydrauliques du detroit du Pas-de-Calais SAC	France	Harbour porpoise	351 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
		Harbour seal			
		Grey Seal			
Borkum-Riffgrund SCI	Germany	Harbour porpoise	261 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
		Harbour seal			
		Grey Seal			
Doggerbank SCI	Germany	Harbour porpoise	160 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
		Harbour seal			
Dünenlandschaft Süd-Sylt SAC	Germany	Grey Seal	400 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
Hamburgisches Wattenmeer SAC	Germany	Harbour porpoise	392 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
		Harbour seal			
		Grey Seal			
Helgoland mit Helgolander Felssockel SAC	Germany	Harbour porpoise	370 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
		Harbour seal			
		Grey Seal			
Nationalpark Niedersachsisches Wattenmeer SAC	Germany	Harbour porpoise	304 km	Out	
		Harbour seal			

Designated Site	Country	Qualifying Species	Distance to closest point of project (km)	Screened In / Out	Rationale
		Grey Seal			The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
NTP S-H Wattenmeer und angrenzende Kustengebiete SAC	Germany	Harbour porpoise	378 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
		Harbour seal			
		Grey Seal			
SPA Ostliche Deutsche Bucht SPA	Germany	Harbour porpoise	338 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
		Harbour seal			
		Grey Seal			
Steingrund SAC	Germany	Harbour porpoise	380 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
		Harbour seal			
		Grey Seal			
Sylter Außenriff SCI	Germany	Harbour porpoise	277 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
		Harbour seal			
		Grey Seal			
Unterelbe SAC	Germany	Harbour porpoise	431 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or in-direct effects, alone or in-combination.
		Harbour seal			
Doggersbank SAC	Netherlands	Harbour porpoise	43 km	Out	Marine mammal features of this site are of 'D' grade, meaning that the species is present within the site but in non-significant presence (JNCC, 2022b). These are non-qualifying species and as such are not included within a site's conservation objectives. Therefore, this site has not been considered further.
		Harbour seal			
		Grey Seal			
Klaverbank SAC	Netherlands	Harbour porpoise	44 km	In	

Designated Site	Country	Qualifying Species	Distance to closest point of project (km)	Screened In / Out	Rationale
		Harbour seal			Potential for connectivity. It is assumed that harbour porpoise, harbour seal and grey seal in the Project area, or areas of potential effect, could also have connectivity to the Project.
		Grey Seal			
Noordzeekustzone SAC	Netherlands	Harbour porpoise	216 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
		Harbour seal			
		Grey Seal			
Oosterschelde SPA and SAC	Netherlands	Harbour porpoise	308 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
		Harbour seal			
		Grey Seal			
Vlakte van de Raan SAC	Netherlands	Harbour porpoise	327 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
		Harbour seal			
		Grey Seal			
Voordelta SAC and SPA	Netherlands	Harbour porpoise	295 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
		Harbour seal			
		Grey Seal			
Waddenzee SAC	Netherlands	Harbour porpoise	230 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
		Harbour seal			
		Grey Seal			
Westerschelde & Saeftinghe SAC	Netherlands	Harbour porpoise	332 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
		Harbour seal			
		Grey Seal			

Designated Site	Country	Qualifying Species	Distance to closest point of project (km)	Screened In / Out	Rationale
Kosterfjorden-Väderöfjorden SAC	Sweden	Harbour porpoise	708 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
		Harbour seal			
Vlaamse Banken SAC	Belgium	Harbour porpoise	318 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
		Harbour seal			
		Grey Seal			
SBZ 1 / ZPS 1 SAC	Belgium	Harbour porpoise	353 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
		Harbour seal			
		Grey Seal			
Vlakte van de Raan SCI	Belgium	Harbour porpoise	337 km	Out	The distance between the potential effect range of the Projects and this designated site is beyond that of potential for direct or indirect effects, alone or in-combination.
Moray Firth SAC	Scotland	Bottlenose dolphin	440km	In	Potential connectivity with individuals from the Moray Firth population travelling down and foraging within/in the vicinity of the Projects offshore development area.

4.3.4.1 Summary of Initial Screening of Sites

177. The initial screening process has identified the designated sites to be taken forward for determination of LSE (**Table 4-8**). These sites are detailed in **Figure 4-3** and **Figure 4-4** below.

Table 4-8 Summary of screened in sites for marine mammals

Designated site	Relevant Annex II marine mammal	Distance from the Project
Southern North Sea SAC	Harbour porpoise	Array areas within SAC
Humber Estuary SAC	Grey seal	44km
Klaverbank SAC	Harbour porpoise, harbour seal and grey seal	44km
The Wash and North Norfolk Coast SAC	Harbour seal	103km
Berwickshire & North Northumberland Coast SAC	Grey seal	173km
Moray Firth SAC	Bottlenose dolphin	440km

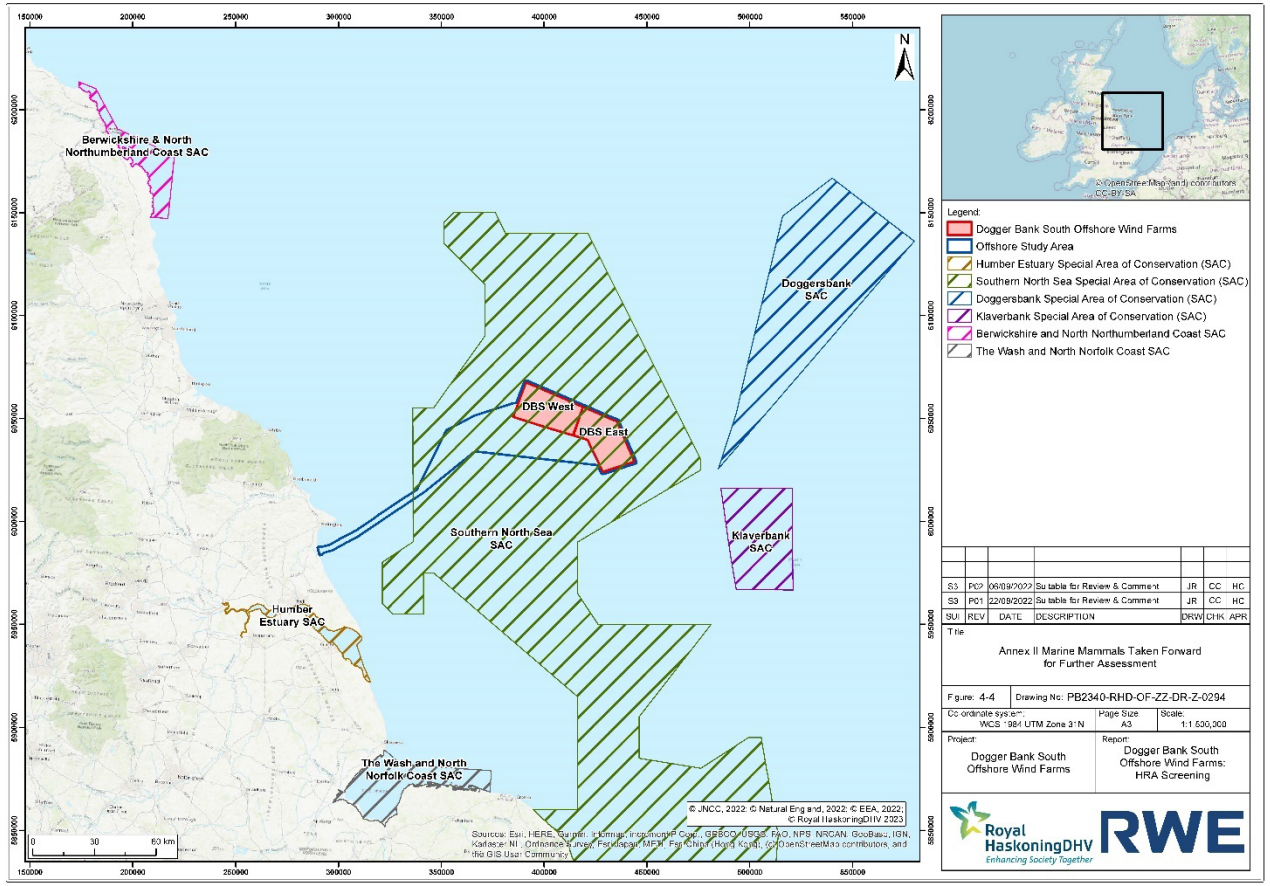

Figure 4-3 SACs for Annex II Marine Mammals Screened In For Further Assessment (1 of 2)

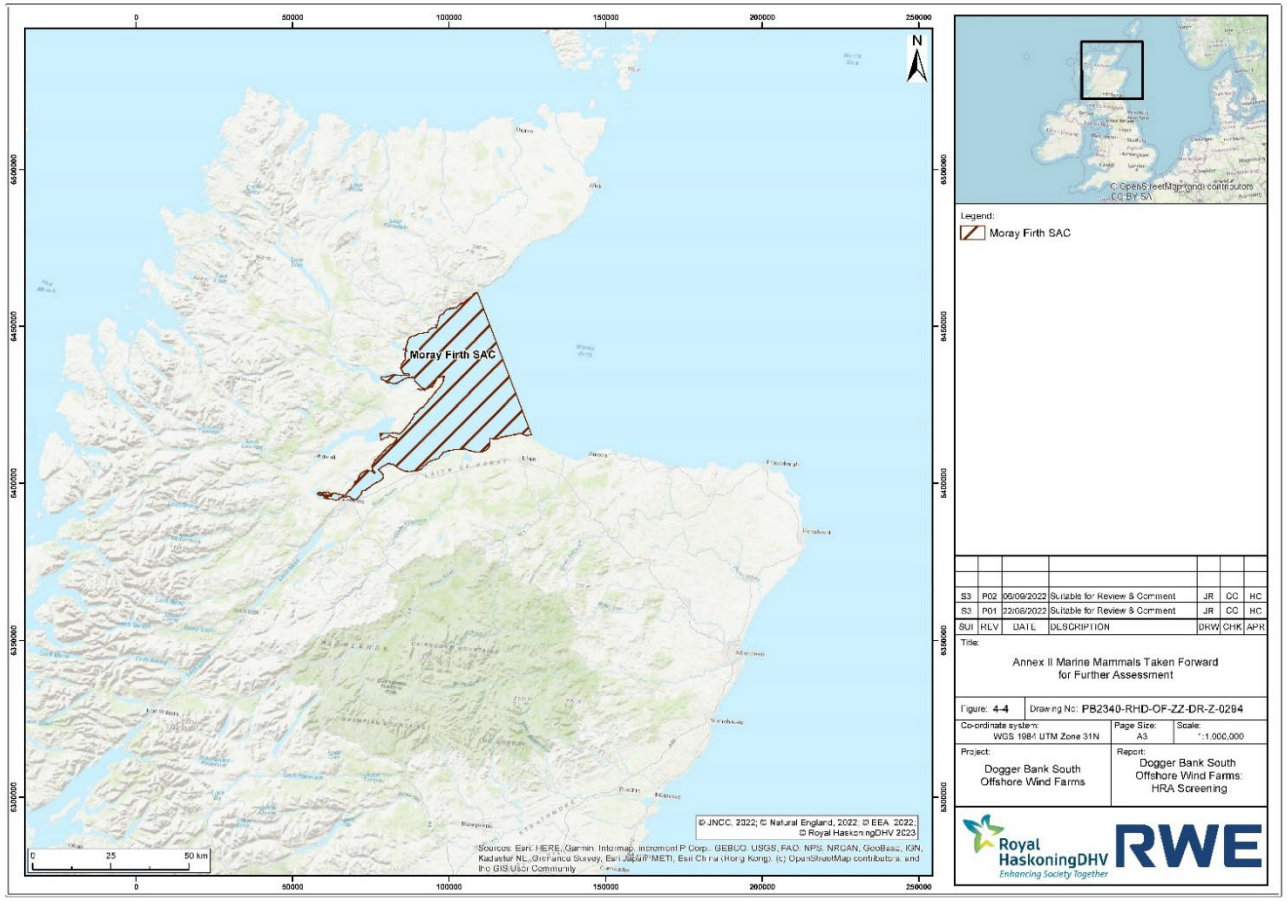

Figure 4-4 SACs for Annex II Marine Mammals Screened In For Further Assessment (2 of 2)

4.4 Sites Designated for Marine Ornithological Features

179. SPA, pSPA and Ramsar sites around the North Sea basin, in the northern North Sea and around the coast of the British Isles for which there is the potential for connectivity are considered for HRA Screening (see **Table 4-10**).

4.4.1 Approach to Screening

180. Following Natural England guidance (Natural England 2022) and the same principles as used in assessments for previous developments such as Norfolk Boreas, East Anglia ONE, East Anglia THREE and Norfolk Vanguard (Norfolk Boreas Limited, 2019, APEM 2012, EAOL 2013, Planning Inspectorate 2013, DECC 2014, Norfolk Vanguard Limited, 2018), SPAs, pSPAs and Ramsar sites will be screened related to birds potentially affected by the offshore components of the proposed Projects as follows:

- A component of the Projects directly overlaps a site whose interest features includes a species of bird (applies to SPAs and Ramsar sites).
- The distance between one of the Projects and a site with a bird interest feature is within the range for which there could be an interaction. For seabirds in the breeding season this element of the screening process will be informed by published information on maximum foraging range (especially the data presented in Woodward et al., 2019).
- Assessment of species-specific risk which informs the extent to which populations of particular species may be vulnerable to collision mortality, displacement or barrier effects (Garthe & Hüppop 2004, Cook et al. 2012, Furness et al. 2013, Bradbury et al. 2014).
- The distance between the Projects and resources on which the interest feature depends (i.e. an indirect effect acting though prey or access to habitat) is within the range for which there could be an interaction i.e. the pathway is not too long (applies to SPAs and Ramsar sites).
- Evidence that a migratory route passes through a Project wind turbine array for bird species migrating to and / or from protected sites (applies to SPAs and Ramsar sites). This will be informed by published information on migration routes, principally Wright et al. (2012), but also Wernham et al. (2002), Brown and Grice (2005) and Furness (2015).

181. Information on SPAs with marine ornithological features as a qualifying feature are taken from SAC citations/Natura 2000 forms, conservation objectives, and other relevant information as published by the relevant SNCBs. Distances between the Project and SPA sites were measured in GIS (the shortest straight-line distance) using shapefiles downloaded from SNCB websites.

4.4.2 Potential Effects (Source)

182. **Table 4-9** below details the potential effects, related to specific stages of the offshore components of the Projects, that will be considered in the HRA process.

Table 4-9 Potential effects identified for marine ornithological features (screened in (✓) and screened out (×))

Potential Effect	Construction	Operation & Maintenance	Decommissioning
Disturbance / Displacement (see Schwemmer et al. 2011, Dierschke et al. 2016)	✓	✓	✓
Indirect impacts through effects on habitats and prey species	✓	✓	✓
Collision Risks (Band 2000, 2012)	×	✓	×
Barrier Effects (Carter et al. 2017)	×	✓	×

4.4.3 Receptors

183. Based on the data collected from site specific surveys for the Projects and a review of existing data sources, the bird species likely to occur in the Projects can be grouped into a series of categories for the purposes of this high level screening process.

184. This categorisation is based on biological relationships related to breeding biology, feeding, habitat use and migratory pathways. The categories are:

- Breeding seabirds;

- Breeding waterbirds;
- Non-breeding seabirds;
- Passage waterbirds; and
- Wintering waterbirds.

4.4.4 Pathways for LSE

4.4.4.1 Breeding seabirds in the breeding season

185. Seabirds which breed at SPAs within the Natural England advised screening range (mean maximum foraging range +1s.d.) have the potential to interact with the Projects and are therefore screened in.

4.4.4.2 Breeding seabirds in the non-breeding season and migratory birds

186. Some bird species are highly mobile and may interact with the Projects because they range over considerable distances. This applies to breeding seabirds in the non-breeding season as well as migratory seabirds and waterbirds. However, for seabirds this also means that the relative contribution of any particular (breeding) SPA colony to the birds present in the Projects in the non-breeding season is typically very small. This particularly applies as the distance from the SPA to the Projects increases. Thus, only those SPAs screened in for potential effects during the breeding season and ones for which the suite of SPAs from which passage birds may be drawn is small have been screened in for non-breeding effects.

187. Migrating terrestrial birds have the potential to move through the area of the Projects and so may interact during their migration. However, from an initial consideration of all SPAs and Ramsar sites in the UK and in neighbouring Member States that were listed in the Screening Report for the offshore wind leasing Round 4 plan level HRA (The Crown Estate, 2021), no risk of LSE in association with the Projects was identified for any mobile species that were screened into the screening assessment. Indeed, the plan level HRA found that no species of migratory bird was estimated to be at risk of more than a single collision, it is appropriate to screen out SPAs for migrating waterbirds.

188. Therefore, migratory waterbirds and seabirds from breeding colonies located beyond breeding season screening range (mean max. +1 s.d.) are screened out of this assessment.

189. This means that many SPA sites within the UK and in neighbouring Member States can be screened out of the HRA because there is either no connectivity between the SPA site and the Projects in terms of populations of birds that are features of the SPAs or that level of connectivity is so low

that effects can be regarded as below the threshold of detection. This applies to most SPAs that are distant from the proposed project.

4.4.4.3 In-combination effects

190. The in-combination assessment will identify where the predicted effects of the construction, operation & maintenance and decommissioning of the Projects could interact with effects from different activities, plans or projects within the same region and affect seabirds in the breeding and non-breeding seasons and migrating terrestrial species.

191. The types of plans and projects to be taken into consideration are as listed in Section 3.3.1. although this will primarily relate to offshore wind farm plans and projects, based on the following key points:

- During the breeding season, those projects within foraging range (as defined above) of SPAs screened in for the Projects;
- During the non-breeding season, those projects within the relevant species specific UK biologically defined minimum population scales (BDMPS; Furness 2015); and
- There is the potential for the other plans and projects to contribute to cumulative effects during the construction, operation & maintenance and decommissioning of the proposed Project.

192. The offshore ornithological in-combination assessment will consider projects, plans and activities which have sufficient information available to undertake the assessment, and will include the potential effects listed in **Table 4-9**.

193. The in-combination assessment will follow the approaches taken for the recent Vattenfall Norfolk Projects and the SPR East Anglia Projects, with the inclusion of more recent wind farms (e.g. Hornsea 4 and the Dudgeon and Sheringham Extensions).

194. Agreed totals from the most recent examination available at the time of writing (which will be several months prior to submission of the DCO Application) will be used as the starting point with Project alone numbers added for displacement and collision risk.

4.4.4.4 Transboundary considerations

195. Shorebirds, such as waders, which are features of European SPAs, may migrate from the mainland of Europe to eastern England (for example from SPAs in Netherlands to the Wash or Thames estuaries) so consideration needs to be given to these species. However, migrating shorebirds tend to fly at much higher altitudes than wind turbines, and across wide migration

fronts, resulting in very low collision risk estimates (e.g. The Crown Estate, 2021; Wright et al. 2012; WWT 2013).

196. The Netherlands Ministry of Infrastructure and the Environment has previously raised concerns that offshore wind farms proposed in the southern North Sea could have effects on the seabirds of Bruine Bank (Brown Ridge) pSPA. The non-breeding seabirds that are the interest feature of the Bruine Bank pSPA are primarily auks. Outside the breeding season these species are not constrained to undertake foraging trips and therefore there is no basis for assuming connectivity between the Bruine Bank pSPA and the Projects. Accordingly, a likely significant effect on the Bruine Bank (Brown Ridge) pSPA can be screened out.

197. Impacts on seabird breeding populations in The Netherlands, Germany, Belgium and France can be screened out due to the distance of colonies in those countries from the proposed project (**Table 4-10**), which, with two exceptions discussed in the next paragraph, exceeds the screening foraging ranges (mean max. +1 s.d.) of breeding seabirds (Woodward et al., 2019).

198. There are two gannet and fulmar colonies, Seevogelschutzgebiet Helgoland SPA (Germany) and Littoral Seino-Marin SPA (France), located within these species' reported maximum connectivity ranges (gannet = 315±194km, fulmar = 542 ±657km, Woodward et al., 2019) from the Projects. However, tracking studies of breeding adults at each of these colonies show that birds from those colonies do not travel as far as the Dogger Bank but forage relatively close to their breeding colonies (Stefan Garthe, pers. comm., Wakefield et al. 2013).

199. Therefore, no trans-boundary issues are screened into this assessment.

4.4.5 Site ID and screening determination

200. **Table 4-10** provides a list of SPAs and Ramsar sites in the North Sea and around the British Isles, the distance to the Projects, the type of feature for which they are designated, the screening decision (i.e. can LSE be ruled out) and the basis for that decision.

Table 4-10 List of SPA and Ramsar sites, the bird interest feature category(ies), screening decision and rationale (screened out sites are shown in grey)

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
UK9006101	UK	Flamborough and Filey Coast SPA	Breeding seabirds: Fulmar Gannet Kittiwake Herring gull Guillemot Razorbill Puffin	100 (SPA has small overlap with export cable corridor)	IN	SPA is adjacent to the export cable corridor and there is potential for connectivity for designated populations of breeding gannet, kittiwake, common guillemot, razorbill and puffin based on mean maximum foraging range (+ 1 Standard Deviation (SD)). Flamborough and Filey Coast colony specific maximum foraging ranges for gannet, kittiwake indicate connectivity. Tracking data shows connectivity for breeding gannets and kittiwakes from Bempton cliffs and breeding kittiwakes from Filey. There is potential for disturbance to breeding cormorant, shag and herring gull from operation & maintenance vessels. Uncertain proportions of the kittiwake, gannet, common guillemot, razorbill and puffin populations may migrate through DBS East and DBS West.
UK9006171	UK	Hornsea Mere SPA	Wintering and passage waterbirds: Gadwall	119	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration (Wright et al. 2012; WWT 2013).
UK9014041	UK	Greater Wash SPA	Non-breeding seabirds: Red-throated diver Common scoter Little gull (Migratory) and breeding terns: Sandwich tern Little tern Common tern	130 (SPA has small overlap with export cable corridor)	IN	SPA has small amount of overlap with the export cable corridor and there is potential for disturbance to designated wintering red-throated diver and common scoter from cable installation activities and operation & maintenance vessels. SPA is beyond mean maximum foraging range of designated breeding seabird species (terns) and tern foraging tends to be coastal so has no breeding season connectivity. Proportions of these tern populations migrating through DBS East and DBS West are likely to be small as these species are thought to remain close to shore during much of their migration through UK waters, so no further assessment of these features is considered necessary. Migration of non-breeding little gull from this SPA are likely to result in small numbers passing through the site during

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
						migration, but, given the proximity of the site to this SPA, furthermore detailed assessment of this is appropriate.
UK0030170	UK	Humber Estuary SPA and Ramsar	Wintering and passage waterbirds: Golden plover Black-tailed godwit Bar-tailed godwit Ruff Shelduck Dunlin Knot Redshank Bittern Hen harrier Marsh harrier Avocet Little tern Waterbird assemblage	142	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration (Wright et al. 2012; WWT 2013).
UK9006061	UK	Teesmouth and Cleveland Coast SPA and Ramsar	Wintering and passage waterbirds. Breeding terns: Sandwich tern Common tern Little tern Avocet Ruff Knot Redshank Waterbird assemblage	145	Out	SPA is beyond mean maximum foraging range of designated breeding seabird species (terns). Tern foraging tends to be coastal so has no breeding season connectivity. Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
UK9006131	UK	Northumbria Coast SPA and Ramsar	Breeding seabirds, wintering and passage waterbirds: Arctic tern Purple sandpiper Turnstone Little tern	165	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9009031	UK	North Norfolk Coast SPA and Ramsar	Wintering and passage waterbirds and breeding terns: Bittern Pink-footed goose Wigeon Marsh harrier Avocet Knot Sandwich tern Common tern Little tern Dark-bellied brent goose	165	Out	SPA is beyond mean maximum foraging range of designated breeding seabird species (terns). Tern foraging tends to be coastal so has no breeding season connectivity. Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9008022	UK	Gibraltar Point SPA and Ramsar	Wintering and passage waders and breeding terns: Grey plover Sanderling Bar-tailed godwit Little tern	170	Out	SPA is beyond mean maximum foraging range of designated breeding seabird species (little tern). Tern foraging tends to be coastal so has no breeding season connectivity. Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9008021	UK	The Wash SPA and Ramsar	Breeding seabirds, wintering and passage waterbirds:	176	Out	SPA is beyond mean maximum foraging range of designated breeding terns. Tern foraging tends to be coastal so has no breeding season connectivity.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Bewick's swan Pink-footed goose Shelduck Wigeon Gadwall Pintail Common scoter Goldeneye Oystercatcher Grey plover Knot Sanderling Bar-tailed godwit Curlew Redshank Turnstone Common tern Little tern Black-tailed godwit Dunlin Dark-bellied brent goose			Survey data show little or no evidence of SPA non-breeding features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9009271	UK	Great Yarmouth and North Denes SPA	Breeding seabirds: Little tern	180	Out	SPA is beyond maximum foraging range of designated seabird species (little tern) and little tern foraging tends to be coastal so has no breeding season connectivity. Proportions of this populations migrating through DBS East and DBS West are likely to be small as the species is thought to remain close to shore during much of its migration through UK waters.
UK9009253	UK	Broadland SPA and Ramsar	Wintering and passage waterbirds:	183	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Bittern Bewick's swan Whooper swan Wigeon Gadwall Shoveler Marsh harrier Hen harrier Ruff			from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9020325	UK	Northumberland Marine SPA	Breeding seabirds: Sandwich tern Roseate tern Common tern Arctic tern Little tern Guillemot Puffin	183	OUT	This SPA provides protection for the marine areas used by the breeding seabird features of colony SPAs and there is therefore no connectivity between the marine area and the Projects. The designated breeding colonies within the SPA are considered on their merits individually elsewhere in this screening assessment.
UK902032	UK	Lower Derwent Valley Ramsar	Wintering waterfowl: Bewick's swan Wigeon Teal Shoveler Golden plover Ruff	183	Out	Proportions of the populations migrating through DBS East and DBS West are likely to be small as the species are thought to remain close to shore during much of their migration through UK waters.
UK9020309	UK	Outer Thames Estuary SPA	Wintering marine birds and breeding terns: Red-throated diver Common tern	190	Out	SPA is beyond mean maximum foraging range of designated breeding seabird species (common tern and little tern) and designated wintering red-throated diver. Tern foraging tends to be coastal so has no breeding season connectivity.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Little tern			Proportions of these populations migrating through DBS East and DBS West are likely to be small as these species are thought to remain close to shore during much of their migration through UK waters. Non-breeding seabirds are unlikely to migrate from this SPA as the migration of divers and sea ducks from SE England tends to be to German Bight and north-eastwards to breeding areas, and not therefore in the direction of DBS East and DBS West.
UK9006031	UK	Coquet Island SPA	Breeding seabirds: Seabird assemblage Arctic tern Common tern Roseate tern Sandwich tern	194	IN	There is potential for connectivity for designated assemblage features (breeding fulmar, lesser black-backed gull, kittiwake and puffin based on mean maximum foraging range + 1SD). However, tracking data for breeding kittiwakes from Coquet does not indicate connectivity. SPA is beyond mean maximum foraging range of designated breeding tern species, for which foraging tends to be coastal so has no breeding season connectivity. Uncertain proportions of the fulmar, lesser black-backed gull, kittiwake and puffin populations likely migrate through DBS East and DBS West.
UK9009181	UK	Breydon Water SPA and Ramsar	Wintering and passage waterbirds: Bewick's swan Avocet Golden plover Lapwing Ruff Common tern	195	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
N/A	Netherlands	Bruine Bank (Brown Ridge) pSPA	Non-breeding seabirds	195	Out	Migrations of birds from this SPA are likely to result in negligible numbers passing through DBS East and DBS West during migration relative to the size of BDMPS regional populations.
UK9006021	UK	Farne Islands SPA	Breeding seabirds: Seabird assemblage Arctic tern	210	IN	There is potential for connectivity for designated assemblage features (breeding **kittiwake** based on mean maximum foraging range + 1SD). However, the Farne

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Common tern Roseate tern Sandwich tern Guillemot			Islands colony-specific maximum foraging range of kittiwakes suggests no connectivity. SPA is beyond mean maximum foraging range of designated breeding tern species and common guillemot. Tern foraging tends to be coastal so have no breeding season connectivity. Uncertain proportions of **kittiwake** and **guillemot** possibly migrate through DBS East and DBS West.
N/A	Netherlands	Frisian Front pSPA	Non-breeding seabirds	c. 210	Out	Migrations of birds from this pSPA are likely to result in negligible numbers passing through DBS East and DBS West during migration relative to the size of BDMPS regional populations.
UK9006011	UK	Lindisfarne SPA and Ramsar	Breeding terns, wintering and passage waterbirds: Bar-tailed godwit Common scoter Dunlin Eider Golden plover Grey plover Greylag goose Light-bellied brent goose Little tern Long-tailed duck Red-breasted merganser Redshank Ringed plover Roseate tern Sanderling	219	Out	SPA is beyond mean maximum foraging range of designated breeding seabird species (roseate tern and little tern). Tern foraging tends to be coastal so has no breeding season connectivity. Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Shelduck Whooper swan Wigeon Waterbird assemblage			
UK9009101	UK	Minsmere - Walberswick SPA and Ramsar	Breeding, wintering and passage waterbirds: Bittern Gadwall Teal Shoveler Marsh harrier Hen harrier Avocet Tern Nightjar White-fronted goose	226	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
NL9801001	Netherlands	Waddenzee (Wadden Sea) SPA	Breeding seabirds, wintering and passage waterbirds	226	Out	Theoretically, there is potential for connectivity for designated breeding lesser black-backed gull based on mean maximum foraging range (+ 1SD). However, survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
NL3009008	Netherlands	Duinen en Lage Land Texel SPA	Breeding seabirds, wintering and passage waterbirds	226	Out	Theoretically, there is potential for connectivity for designated breeding lesser black-backed gull based on mean maximum foraging range (+ 1SD). However, survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
NL3009009	Netherlands	Duinen Vlieland SPA	Breeding seabirds, wintering and passage waterbirds	226	Out	Theoretically, there is potential for connectivity for designated breeding lesser black-backed gull based on mean maximum foraging range (+ 1SD). However, survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9009112	UK	Alde-Ore Estuary SPA and Ramsar	Breeding seabirds and breeding, wintering and passage waterbirds: Marsh harrier Avocet Ruff Redshank Lesser black-backed gull Sandwich tern Little tern	246	Out	SPA is beyond mean maximum foraging range of designated breeding seabird species (lesser black-backed gull, little tern and Sandwich tern) and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9020316	UK	Outer Firth of Forth and St Andrews Bay Complex SPA	Breeding seabirds and breeding, wintering and passage waterbirds: Red-throated diver Slavonian grebe Manx shearwater Gannet Shag Eider Long-tailed duck Common scoter Velvet scoter Goldeneye	250	IN	There is potential for connectivity for designated breeding gannet, kittiwake and puffin based on mean maximum foraging range (+ 1SD). There no breeding sites for Manx shearwater in this SPA, so any birds observed are adults from other colonies or sub-adults, So this feature is at no more than a very small risk at DBS East and DBS West. Uncertain proportions of breeding seabirds may migrate through DBS East and DBS West. Migrations of nonbreeding birds from this SPA are likely to result in negligible numbers passing through the site during migration.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Red-breasted merganser Little gull Black-headed gull Mew gull Herring gull Kittiwake Common tern Arctic tern Guillemot Razorbill Puffin			
UK0030281	UK	St Abbs Head to Fast Castle SPA	Breeding seabirds: Kittiwake Razorbill Guillemot Shag Herring gull	252	IN	There is potential for connectivity for designated breeding kittiwake based on mean maximum foraging range (+ 1SD), although the St Abb's Head colony-specific maximum foraging range of kittiwakes suggests no connectivity. Tracking data also shows no connectivity for breeding kittiwakes. SPA is beyond mean maximum foraging range of designated breeding herring gull, common guillemot and razorbill. Uncertain proportions of the kittiwake, herring gull common guillemot and razorbill populations most likely migrate through DBS East and DBS West.
UK9009261	UK	Deben Estuary SPA and Ramsar	Wintering and passage waterbirds: Avocet Dark-bellied brent goose	257	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
DE2104301	Germany	Borkum- Riffgrund SPA	Non-breeding seabirds	261	Out	Migrations of birds from this SPA are likely to result in negligible numbers passing through DBS East and DBS West during migration relative to the size of BDMPS regional populations.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
UK9009121	UK	Stour & Orwell Estuaries SPA and Ramsar	Wintering and passage waterbirds: Great crested grebe Cormorant Mute swan Shelduck Wigeon Gadwall Pintail Scaup Goldeneye Avocet Ringed plover Golden plover Grey plover Lapwing Knot Curlew Redshank Turnstone Black-tailed godwit Dunlin Dark-bellied brent goose	272	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9004411	UK	Firth of Forth SPA	Wintering and passage waterbirds: Red-throated diver Great crested grebe Slavonian grebe	278	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Cormorant Pink-footed goose Shelduck Wigeon Mallard Scaup Eider Long-tailed duck Common scoter Velvet scoter Goldeneye Red-breasted merganser Oystercatcher Ringed plover Golden plover Grey plover Lapwing Knot Bar-tailed godwit Curlew Redshank Turnstone Sandwich tern Dunlin			
UK9009131	UK	Hamford Water SPA and Ramsar	Wintering and passage waterbirds: Shelduck Teal	278	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Avocet Ringed plover Grey plover Redshank Little tern Black-tailed godwit Dark-bellied brent goose			
DE1209301	Germany	Sylter Außenriff SPA	Non-breeding seabirds	286	Out	Migrations of birds from this SPA are likely to result in negligible numbers passing through DBS East and DBS West during migration relative to the size of BDMPS regional populations.
UK9004171	UK	Forth Islands SPA	Breeding seabirds: Gannet Kittiwake Arctic tern Common tern Sandwich tern Guillemot Razorbill Puffin Fulmar Shag Cormorant Herring gull Lesser Black-backed Gull Roseate tern	289	IN	There is potential for connectivity for designated breeding gannet and kittiwake based on mean maximum foraging range (+ 1SD). Bass Rock colony-specific maximum foraging ranges for gannet indicate connectivity, although Isle of May colony-specific maximum foraging ranges for kittiwake do not indicate connectivity. Tracking data shows potential connectivity for breeding gannets from Bass Rock and kittiwakes from Isle of May. SPA is beyond mean maximum foraging range of designated breeding lesser black-backed gull, common guillemot, razorbill and puffin and also beyond Firth of Forth colony-specific maximum foraging ranges of auks. Uncertain proportions of the kittiwake, gannet, lesser black-backed gull, common guillemot, razorbill and puffin populations most likely migrate through DBS East and DBS West.
UK9009243	UK	Colne Estuary SPA and Ramsar	Wintering and passage, waterbirds:	290	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Pochard Hen harrier Ringed plover Redshank Little tern Dark-bellied brent goose			from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9009141	UK	Abberton Reservoir SPA and Ramsar	Wintering and passage waterbirds: Great crested grebe Cormorant Mute swan Wigeon Gadwall Teal Shoveler Pochard Tufted duck Goldeneye Coot	291	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9009245	UK	Blackwater Estuary SPA and Ramsar	Wintering and passage waterbirds: Pochard Hen harrier Ringed plover Grey plover Little tern Black-tailed godwit Dunlin	295	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Dark-bellied brent goose			
UK9009242	UK	Dengie SPA and Ramsar	Wintering and passage waterbirds: Hen harrier Grey plover Knot Dark-bellied brent goose	298	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9009246	UK	Foulness SPA and Ramsar	Wintering and passage waterbirds: Hen harrier Oystercatcher Avocet Ringed plover Grey plover Knot Bar-tailed godwit Redshank Sandwich tern Common tern Little tern Dark-bellied brent goose	306	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
NL4000017	NL	Voordelta SPA	Wintering and passage waterbirds	118	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9009244	UK	Crouch & Roach Estuaries SPA and Ramsar	Wintering and passage waterbirds:	313	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Dark-bellied brent goose			from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9004121	UK	Firth of Tay & Eden Estuary SPA	Wintering and passage waterbirds: Cormorant Pink-footed goose Greylag goose Shelduck Eider Long-tailed duck Common scoter Velvet scoter Goldeneye Red-breasted merganser Goosander Marsh harrier Oystercatcher Grey plover Sanderling Bar-tailed godwit Redshank Little tern Black-tailed godwit Dunlin	318	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9004031	UK	Montrose Basin SPA	Wintering and passage waterbirds: Pink-footed goose Greylag goose Shelduck	326	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Wigeon Common eider Oystercatcher Redshank Knot Dunlin			
UK9002271	UK	Fowlsheugh SPA	Breeding seabirds: Kittiwake Razorbill Guillemot Fulmar Herring gull	327	Out	Theoretically, there is potential for connectivity for designated breeding fulmar based on mean maximum foraging range (+ 1SD). However, this potential is considered to be extremely small. SPA is beyond mean maximum foraging range of all other designated breeding seabird species (kittiwake, herring gull, guillemot and razorbill). The Fowlsheugh colony-specific maximum foraging range of kittiwake and common guillemot is beyond range and tracking data shows no connectivity for breeding kittiwake from Fowlsheugh. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9009171	UK	Benfleet & Southend Marshes SPA and Ramsar	Wintering and passage waterbirds: Ringed plover Grey plover Knot Dunlin Dark-bellied brent goose	328	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9012021	UK	Thames Estuary and Marshes SPA and Ramsar	Wintering and passage waterbirds: Hen harrier Avocet Ringed plover Grey plover	332	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Knot Redshank Black-tailed godwit Dunlin			
UK9012071	UK	Thanet Coast and Sandwich Bay SPA and Ramsar	Wintering and passage waterbirds: Golden plover Turnstone Little tern	332	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
NL9802025	Netherlands	Veerse Meer Ramsar	Breeding seabirds, wintering and passage waterbirds	333	Out	No potential for connectivity for designated breeding lesser black-backed gull based on mean maximum foraging range (+ 1SD). Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9004451	UK	Imperial Dock Lock, Leith SPA	Breeding seabirds: Common tern	334	Out	SPA is far beyond maximum foraging range of designated seabird species (common tern) so has no breeding season connectivity. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9012031	UK	Medway Estuary & Marshes SPA and Ramsar	Wintering and passage waterbirds: Red-throated diver Great crested grebe Cormorant Bewick's swan Shelduck Wigeon Teal Mallard	335	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Pintail Shoveler Pochard Hen harrier Merlin Oystercatcher Avocet Ringed plover Grey plover Knot Curlew Redshank Greenshank Turnstone Common tern Little tern Black-tailed godwit Dunlin Dark-bellied brent goose			
UK13033	UK	Loch Leven Ramsar	Wintering and passage waterbirds: Cormorant Whooper swan Pink-footed goose Gadwall Teal Shoveler Pochard	338	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Tufted duck Goldeneye			
UK9012011	UK	The Swale SPA	Wintering and passage waterbirds: Gadwall Teal Oystercatcher	338	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9002221	UK	Ythan Estuary, Sands of Forvie and Meikle Loch SPA	Breeding Terns, Wintering and passage waterbirds: Pink-footed goose Eider Lapwing Redshank Sandwich tern Common tern Little tern	344	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9002491	UK	Buchan Ness to Collieston Coast SPA	Breeding seabirds: Fulmar Kittiwake Guillemot Shag Herring gull	355	Out	Theoretically, there is potential for connectivity for designated breeding fulmar based on mean maximum foraging range (+ 1SD). However, the Buchan Ness to Collieston Coast colony-specific maximum foraging ranges of fulmar indicate there is no connectivity and tracking data shows no connectivity for breeding fulmar from Bullers of Buchan. SPA is beyond mean maximum foraging range as well as colony-specific maximum foraging range of all other designated breeding seabird species (kittiwake, herring gull, guillemot and shag). Tracking data shows no connectivity for breeding kittiwake and guillemot from Bullers of Buchan. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
UK9002211	UK	Loch of Strathbeg SPA	Breeding Terns, Wintering and passage waterbirds: Whooper swan Pink-footed goose Greylag goose Barnacle goose Teal Goldeneye Sandwich tern	379	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
DE0916491	Germany	Ramsar- Gebiet S-H Wattenmeer und angrenzende Küstengebiet SPA	Breeding, wintering and passage waterbirds	393	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9002471	UK	Troup, Pennan and Lion`s Heads SPA	Breeding seabirds: Kittiwake Razorbill Guillemot Fulmar Herring gull	396	Out	Theoretically, there is potential for connectivity for designated breeding fulmar based on mean maximum foraging range (+ 1SD). However, this potential is considered to be extremely small. SPA is far beyond mean maximum foraging range of all other designated breeding seabird species (kittiwake, herring gull, guillemot and razorbill). Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
DE1813491	Germany	Seevogelschu tzgebiet Helgoland SPA	Breeding seabirds	397	Out	Theoretically, there is potential for connectivity for designated breeding gannet and fulmar based on mean maximum foraging range (+ 1SD). However, tracking data from gannets breeding on Helgoland show these birds do not travel in the direction of or as far as DBS East and DBS West. SPA is far beyond mean maximum foraging range of all other designated breeding seabird species.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
						Proportions of these populations migrating through DBS East and DBS West are likely to be extremely small relative to the BDMPS.
DE1011401	Germany	Östliche Deutsche Bucht SPA	Non-breeding seabirds	397	Out	Migrations of birds from this SPA are likely to result in negligible numbers passing through DBS East and DBS West during migration relative to the size of BDMPS regional populations.
UK9011011	UK	Chichester & Langstone Harbours SPA	Migratory waterbirds: Shelduck Wigeon Teal Pintail Shoveler Red-breasted merganser Ringed plover Grey plover Sanderling Bar-tailed godwit Curlew Redshank Turnstone Sandwich tern Common tern Little tern Dunlin Dark-bellied brent goose	437	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9011051	UK	Portsmouth Harbour SPA	Migratory waterbirds: Red-breasted merganser	445	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Black-tailed godwit Dunlin Dark-bellied brent goose			from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9001625	UK	Moray and Nairn Coast SPA	Wintering and passage waterbirds: Pink-footed goose Greylag goose Wigeon Red-breasted merganser Osprey Oystercatcher Bar-tailed godwit Redshank Dunlin	447	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9011061	UK	Solent & Southampton Water SPA	Migratory waterbirds: Teal Ringed plover Mediterranean gull Sandwich tern Roseate tern Common tern Little tern Black-tailed godwit Dark-bellied brent goose	449	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9001624	UK	Inner Moray Firth SPA	Wintering and passage waterbirds: Cormorant	457	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Greylag goose Wigeon Scaup Goldeneye Red-breasted merganser Goosander Osprey Oystercatcher Black-tailed godwit Curlew Redshank Common tern			from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9001623	UK	Cromarty Firth SPA	Wintering and passage waterbirds: Whooper swan Greylag goose Wigeon Pintail Greater scaup Red-breasted merganser Osprey Oystercatcher Bar-tailed godwit Curlew Redshank Common tern Knot Dunlin	468	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
UK9001622	UK	Dornoch Firth and Loch Fleet SPA	Wintering and passage waterbirds: Greylag goose Wigeon Teal Greater scaup Osprey Oystercatcher Bar-tailed godwit Curlew Redshank Dunlin	471	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9001182	UK	East Caithness Cliffs SPA	Breeding seabirds: Kittiwake Razorbill Guillemot Puffin Fulmar Shag Cormorant Peregrine Herring gull Great black-backed gull	483	Out	Theoretically, there is potential for connectivity for designated breeding fulmar based on mean maximum foraging range (+ 1SD). However, the East Caithness Cliffs colony-specific maximum foraging range of fulmar indicates there is no connectivity. SPA is far beyond mean maximum foraging range of all other designated breeding seabird species. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9001181	UK	North Caithness Cliffs SPA	Breeding seabirds: Kittiwake Razorbill Guillemot Puffin	505	Out	Theoretically, there is potential for connectivity for designated breeding fulmar based on mean maximum foraging range (+ 1SD). However, this potential is considered to be extremely small. SPA is far beyond mean maximum foraging range of all other designated breeding seabird species (except fulmar).

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Fulmar Peregrine			Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
FR2310045	France	Littoral Seino- Marin SPA	Breeding seabirds	511	Out	Theoretically, there is potential for connectivity for designated breeding fulmar based on mean maximum foraging range (+ 1SD). SPA is far beyond mean maximum foraging range of all other designated breeding seabird species. Proportions of these populations migrating through DBS East and DBS West are likely to be extremely small relative to the BDMPS.
UK9001131	UK	Pentland Firth Islands SPA	Breeding seabirds: Arctic tern	513	Out	SPA is far beyond maximum foraging range of designated seabird species (Arctic tern) so has no breeding season connectivity. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9010091	UK	Chesil Beach & The Fleet SPA	Migratory waterbirds: Wigeon Little tern	441	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9002151	UK	Copinsay SPA	Breeding seabirds: Kittiwake Guillemot Fulmar Great black-backed gull	522	Out	Theoretically, there is potential for connectivity for designated breeding fulmar based on mean maximum foraging range (+ 1SD). However, the Copinsay colony-specific maximum foraging range of fulmar indicates there is no connectivity and tracking data shows no connectivity for breeding fulmar from Copinsay. SPA is far beyond mean maximum foraging range of all other designated breeding seabird species (except fulmar). Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9002141	UK	Hoy SPA	Breeding seabirds: Fulmar Arctic skua Great skua	530	Out	Theoretically, there is potential for connectivity for designated breeding fulmar and great skua based on mean maximum foraging range (+ 1SD). However, the Hoy colony-specific maximum foraging range of great skua indicates there is no connectivity and the potential for fulmar connectivity is considered to be extremely small.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Kittiwake Guillemot Puffin Red-throated diver Peregrine Great black-backed gull			SPA is far beyond mean maximum foraging range of all other designated breeding seabird species. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9010081	UK	Exe Estuary SPA	Migratory waterbirds: Slavonian grebe Oystercatcher Avocet Grey plover Black-tailed godwit Dunlin Dark-bellied brent goose	550	Out	Survey data show little or no evidence of SPA features occurring in DBS East and DBS West and migrations of birds from this SPA are likely to result in negligible numbers passing through the site during migration.
UK9002091	UK	Fair Isle SPA	Breeding seabirds: Gannet Arctic skua Great skua Kittiwake Arctic tern Razorbill Guillemot Puffin Fulmar Shag Fair Isle wren	565	Out	Theoretically, there is potential for connectivity for designated breeding fulmar and great skua based on mean maximum foraging range (+ 1SD). However, the Fair Isle colony-specific maximum foraging range of fulmar indicates there is no connectivity and tracking data shows no connectivity for breeding fulmar from Fair Isle. The potential for great skua connectivity is considered to be extremely small. SPA is far beyond mean maximum foraging range of all other designated breeding seabird species. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9002371	UK	Rousay SPA	Breeding seabirds:	559	Out	Theoretically, there is potential for connectivity for designated breeding fulmar based on mean maximum

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Arctic skua Kittiwake Arctic tern Guillemot Fulmar			foraging range (+ 1SD). However, the Eynhallow colony-specific maximum foraging range of fulmar indicates there is no connectivity. SPA is far beyond mean maximum foraging range of all other designated breeding seabird species. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9002431	UK	Calf of Eday SPA	Breeding seabirds: Kittiwake Great black-backed gull Guillemot Fulmar Cormorant	560	Out	Theoretically, there is potential for connectivity for designated breeding fulmar based on mean maximum foraging range (+ 1SD). However, this potential is considered to be extremely small. SPA is far beyond mean maximum foraging range of all other designated breeding seabird species. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9002331	UK	East Sanday Coast SPA	Nonbreeding birds: Purple sandpiper Bar-tailed godwit Turnstone	560	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9002121	UK	Marwick Head SPA	Breeding seabirds: Kittiwake Guillemot	565	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9002101	UK	West Westray SPA	Breeding seabirds: Arctic skua Kittiwake Arctic tern Razorbill Guillemot Fulmar	579	Out	Theoretically, there is potential for connectivity for designated breeding fulmar based on mean maximum foraging range (+ 1SD). However, this potential is considered to be extremely small. SPA is far beyond mean maximum foraging range of all other designated breeding seabird species. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
UK9002111	UK	Papa Westray (North Hill and Holm) SPA	Breeding seabirds: Arctic skua Arctic tern	576	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK22002	UK	Alderney West Coast and the Burhou Islands	Breeding seabirds: Gannet	590	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9002511	UK	Sumburgh Head SPA	Breeding seabirds: Kittiwake Arctic tern Guillemot Fulmar	597	Out	Theoretically, there is potential for connectivity for designated breeding fulmar based on mean maximum foraging range (+ 1SD). However, this potential is considered to be extremely small. SPA is far beyond mean maximum foraging range of all other designated breeding seabird species. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9002061	UK	Seas off Foula SPA	Breeding seabirds: Fulmar Arctic skua Great skua Guillemot Puffin	602	Out	There is potential for connectivity for designated breeding fulmar and great skua based on mean maximum foraging range (+ 1SD). However, the Foula colony-specific maximum foraging range of fulmar and great skua indicates there is no connectivity. SPA is far beyond mean maximum foraging range of all other designated breeding seabird species. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9002361	UK	Mousa SPA	Breeding seabirds: European storm petrel Arctic tern	611	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9002081	UK	Noss SPA	Breeding and wintering waterbirds: Fulmar Gannet Great skua	622	Out	Theoretically, there is potential for connectivity for designated breeding fulmar and great skua based on mean maximum foraging range (+ 1SD). However, this potential is considered to be extremely small. SPA is far beyond mean maximum foraging range of all other designated breeding seabird species.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Kittiwake Guillemot Puffin			Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9020311	UK	East Mainland Coast, Shetland SPA	Breeding seabirds: Red-throated diver Great northern diver Slavonian grebe	629	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9002061	UK	Foula SPA	Breeding seabirds: Arctic skua Great skua Kittiwake Arctic tern Razorbill Guillemot Puffin Fulmar Leach's petrel Shag Red-throated diver	634	Out	Theoretically, there is potential for connectivity for designated breeding fulmar and great skua based on mean maximum foraging range (+ 1SD). However, the Foula colony-specific maximum foraging range of fulmar and great skua indicates there is no connectivity. There is potential for connectivity for designated breeding Leach's storm petrel based on mean foraging range. However, this potential is considered to be extremely small. SPA is far beyond mean maximum foraging range of all other designated breeding seabird species. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9002051	UK	Papa Stour SPA	Breeding seabirds: Ringed plover Arctic tern	649	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9002031	UK	Fetlar SPA	Breeding seabirds: Arctic skua Great skua Arctic tern Fulmar Dunlin	667	Out	Theoretically, there is potential for connectivity for designated breeding fulmar and great skua based on mean maximum foraging range (+ 1SD). However, this potential is considered to be extremely small. SPA is far beyond mean maximum foraging range of all other designated breeding seabird species.

Site code	Country	SPA/Ramsar site name	Category of interest feature	Closest distance to DBS East and DBS West (km)	Screening decision	Reason for screening decision
			Whimbrel Red-necked Phalarope			Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9002041	UK	Ronas Hill - North Roe and Tingon SPA and Ramsar	Breeding seabirds: Red-throated diver Great skua	668	Out	Theoretically, there is potential for connectivity for designated breeding fulmar and great skua based on mean maximum foraging range (+ 1SD). However, this potential is considered to be extremely small. SPA is far beyond mean maximum foraging range of all other designated breeding seabird species. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9002051	UK	Bluemull and Colgrave Sounds SPA	Breeding divers: Red-throated diver	670	Out	SPA is far beyond maximum foraging range of designated seabird species so has no breeding season connectivity. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.
UK9002011	UK	Hermaness, Saxa Vord and Valla Field SPA	Breeding seabirds: Gannet Great skua Kittiwake Guillemot Puffin Fulmar Shag Red-throated diver	692	Out	Theoretically, there is potential for connectivity for designated breeding fulmar and great skua based on mean maximum foraging range (+ 1SD). However, this potential is considered to be extremely small. SPA is far beyond mean maximum foraging range of all other designated breeding seabird species. Proportions of these populations migrating through DBS East and DBS West are small relative to BDMPS.

4.4.6 Summary

201. Of the 93 designated sites within 692km of the DBS East and DBS West wind farm sites, it is proposed that the seven sites within **Table 4-11** will be considered further as part of the HRA.

Table 4-11 Summary of HRA screening assessment for ornithology

Site	Species/ Feature	Reason for screening decision
Flamborough and Filey Coast SPA	Breeding seabirds	SPA is adjacent to the export cable corridor and there is potential for connectivity for designated populations of breeding **gannet**, **kittiwake**, **common guillemot**, **razorbill** and **puffin** based on mean maximum foraging range (+ 1SD). Flamborough and Filey Coast colony specific maximum foraging ranges for gannet, kittiwake indicate connectivity. Tracking data shows connectivity for breeding gannets and kittiwakes from Bempton cliffs. There is potential for disturbance to breeding **cormorant**, **shag** and **herring gull** from operation & maintenance vessels. Uncertain proportions of the **kittiwake, gannet, common guillemot, razorbill** and **puffin** populations may migrate through DBS East and DBS West.
Greater Wash SPA	Non-breeding seabirds and breeding terns	SPA has small amount of overlap with the export cable corridor and there is potential for disturbance to designated wintering **red-throated diver** and **common scoter** from cable installation activities and operation & maintenance vessels. Migration of non-breeding **little gull** from this SPA are likely to result in small numbers passing through the site during migration, but, given the proximity of the site to this SPA, further detailed assessment of this is appropriate.
Coquet Island SPA	Breeding seabirds	There is potential for connectivity for designated breeding assemblage features; **fulmar**, **lesser black-backed gull, kittiwake** and **puffin** based on mean maximum foraging range (+ 1SD), although tracking data for breeding kittiwakes from Coquet does not indicate connectivity. Uncertain proportions of the **fulmar, lesser black-backed gull, kittiwake, herring gull** and **puffin** populations likely migrate through DBS East and DBS West.

Site	Species/ Feature	Reason for screening decision
Farne Islands SPA	Breeding seabirds	There is potential for connectivity for designated breeding assemblage features; **kittiwake** and **puffin** based on mean maximum foraging range (+ 1SD), although the Farne Islands colony-specific maximum foraging range of kittiwakes suggests no connectivity. Uncertain proportions of the kittiwake and puffin populations possibly migrate through DBS East and DBS West.
Outer Firth of Forth and St Andrews Bay Complex SPA	Breeding seabirds	There is potential for connectivity for designated breeding **gannet**, **kittiwake** and **puffin** based on mean maximum foraging range (+ 1SD). Uncertain proportions of **gannet**, **kittiwake**, **herring gull common guillemot** and **puffin** populations most likely migrate through DBS East and DBS West.
St Abbs Head to Fast Castle SPA	Breeding seabirds	There is potential for connectivity for designated breeding **kittiwake** based on mean maximum foraging range (+ 1SD), although the St Abb's Head colony-specific maximum foraging range of kittiwakes suggests no connectivity. Tracking data also shows no connectivity for breeding kittiwakes. Uncertain proportions of the **kittiwake**, **herring gull common guillemot** and **razorbill** populations most likely migrate through DBS East and DBS West.
Forth Islands SPA	Breeding seabirds	There is potential for connectivity for designated breeding **gannet** and **kittiwake** based on mean maximum foraging range (+ 1SD). Bass Rock colony-specific maximum foraging ranges for gannet indicate connectivity, although Isle of May colony-specific maximum foraging ranges for kittiwake do not indicate connectivity. Tracking data shows potential connectivity for breeding gannets from Bass Rock and kittiwakes from Isle of May. Uncertain proportions of the **kittiwake**, **gannet, lesser black-backed gull, common guillemot, razorbill** and **puffin** populations most likely migrate through DBS East and DBS West.

4.5 Sites Designated for Terrestrial Ecology

4.5.1 Approach to Screening

202. Direct or indirect effects on designated terrestrial sites have been considered for HRA screening. Potential effects may arise from the permanent or temporary physical presence or activities relating to the construction, operation & maintenance or decommissioning of the onshore cable corridor for the Projects.

203. While pathways of effect for individual features are considered, the consideration for the HRA is acknowledged to be for the integrity of a European Site(s) as a whole.

204. This HRA screening exercise considers sites which meet the following criteria:

- A component of the Projects directly overlaps a site whose qualifying features include a habitat; and / or
- The distance between the Projects and the qualifying feature is within the range for which there could be an interaction (i.e. within a ZOI for noise, visual or air quality effects).

205. Information on SACs with terrestrial ecology features as a qualifying feature are taken from SAC citations/Natura 2000 forms, conservation objectives, and other relevant information as published by the relevant SNCBs. Distances between the Project and SAC sites were measured in GIS (the shortest straight-line distance) using shapefiles downloaded from SNCB websites.

206. **Figure 4-5** below details the sites that were taken forward for determination of LSE.

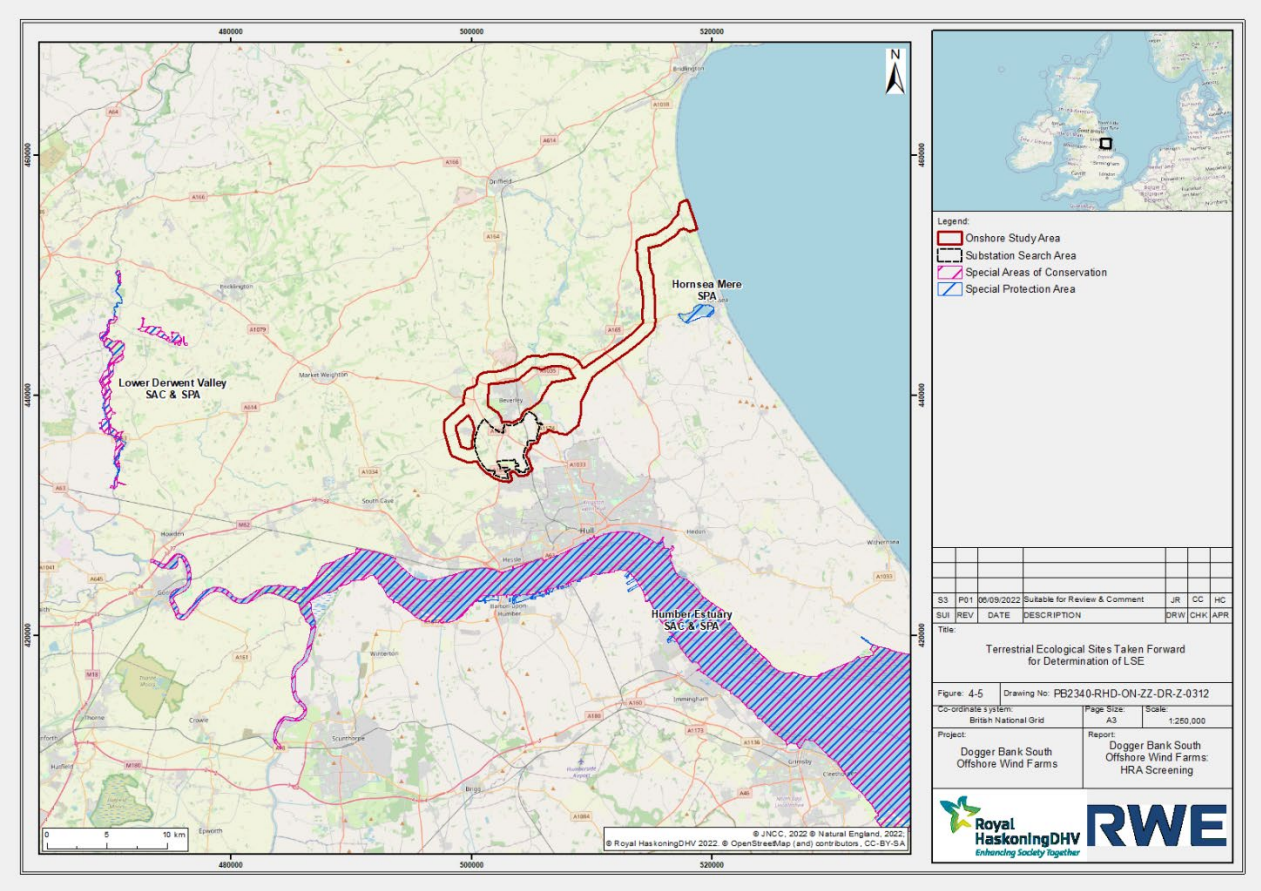

Figure 4-5 Terrestrial Ecological Sites taken forward for determination of LSE

4.5.2 Pathways for LSE

207. Direct or indirect effects to designated terrestrial ecological features may arise from permanent or temporary physical presence of the project and / or activities relating to the construction, operation & maintenance or decommissioning of the Projects and associated infrastructure. Potential effects include habitat loss, and noise and visual disturbance of associated species.

208. The key factors considered during the HRA screening process are:

- Potential effects (source); and
- Proximity of source to feature (i.e. the distance between the potential effects and features from designated sites) (pathway and receptor).

4.5.2.1 Potential effects considered in screening

209. **Table 4-12** below details the potential impacts in relation to the construction, operation & maintenance and decommissioning phases of the Projects.

Table 4-12 Potential Effects Identified for designated terrestrial ecology features (screened in (✓) and screened out (×))

Potential Effect	Construction	Operation & Maintenance	Decommissioning
Permanent and temporary loss of habitats	✓	✓	✓
Temporary habitat fragmentation and species isolation	✓	✓	✓
Impacts on protected species or on their resting or breeding sites	✓	✓	✓
Disturbance of bird populations	✓	✓	✓
Spread of non-native invasive species	✓	✓	✓

4.5.3 Identification of Sites and Features

4.5.3.1 Sites directly overlapping with the Projects boundaries

210. European sites which overlap with the boundaries of the Projects will be taken forward for consideration of LSE. There are no European sites which meet this criterion for designated terrestrial ecological features and so no sites are screened in for further consideration on this basis.

4.5.3.2 Sites within the ZOI of the Projects activities

211. European sites with qualifying mobile features/species which are located within the potential ZOI of impacts associated with the Projects and will be taken forward for consideration of LSE. The closest sites to the onshore cable corridor for the Projects are Hornsea Mere SPA (approx. 2km east of the cable corridor), the Humber Estuary SPA and SAC (approx. 7km south of the cable corridor) and the Lower Derwent Valley SAC and SPA (approx. 22.3km west of the cable corridor).

212. As works within the export cable corridor will be undertaken to a shallow depth (approx. 1m), there will be no alterations to the groundwater/hydrology regime of the Hornsea Mere SPA or Humber Estuary SAC. In addition, due to the closest site of Hornsea Mere SPA being approximately 2km to the east, there will be no perceptible effects to air quality within the site as a result of the works within the onshore cable corridor.

213. Based on evidence from previous reporting on the disturbance of bird species throughout their life history, disturbance of birds from onshore works is predominantly limited to within 1km of the impacts source (Ruddock and Whitfield, 2007). As such, it considered that there will be no LSE from indirect effects (e.g. construction noise and visual disturbance) on the designated features of these sites, and no sites are screened in for further consideration on this basis.

214. As Hornsea Mere SPA being designated for mute swan *Cygnus olor* and gadwall *Anas strepera*, species which are typically found in areas such as gravel pits, lakes, reservoirs, there will be no pathway for significant effects on functionally-linked land to the SPA from the Projects.

215. The Humber Estuary SPA is designated for the following non-breeding species:

- Great bittern Botaurus stellaris;
- Common shelduck *Tadorna tadorna*;
- Hen harrier Circus cyaneus;

- Pied avocet Recurvirostra avosetta;
- European golden plover *Pluvialis apricaria*;
- Red knot Calidris canutus
- Dunlin Calidris alpina;
- Ruff Philomachus pugnax;
- Black-tailed godwit Limosa limosa islandica;
- Bar-tailed godwit *Limosa lapponica*;
- Common redshank *Tringa tetanus*;

216. The SPA is also designated for the following breeding species:

- Great bittern;
- Eurasian marsh harrier *Circus aeruginosus*;
- Pied avocet; and
- Little tern *Sterna albifrons*

217. While it is likely that these species will predominantly be found breeding/foraging within the SPA itself, it is not fully understood if the land within/in the vicinity of the onshore cable route and substation zone(s) is functionally linked with the SPA. As such, there exists a potential pathway for LSE from the Projects on any functionally linked land to the Humber Estuary SPA.

5 Summary of LSE

218. **Table 5-1** below details each European site screened in for the HRA for each topic considered in this screening report.

Table 5-1 Summary of all European sites screened in for the HRA

European Site	Designated Feature Screened In	Distance from the Projects[3]	Rationale for Screening In
Annex I Habitats			
Dogger Bank SAC (Site code: UK0030352)	Sandbanks which are slightly covered by sea water all the time	Within array areas	Site is directly within the Projects proposed array areas.
Flamborough Head SAC (Site code: UK0013036)	Reefs Vegetated sea cliffs of the Atlantic and Baltic Coasts Submerged or partially submerged sea caves	3km south-east	Site is within the potential ZOI for sediment disturbance from export cable corridor trenching, operation & maintenance and decommissioning activities.
Humber Estuary SAC (Site code: UK0030170)	Estuaries Mudflats and sandflats not covered by seawater at low tide Sandbanks which are slightly covered by seawater all the time Coastal lagoons Salicornia and other annuals colonising mud and sand	44.6km south of the proposed landfall locations	Habitats could be impacted by any changes to longshore sediment transport in the region resulting from potential cable protection installation in the nearshore zone.

[3] Distance is measured to either the array areas or export cable corridor, where relevant for each topic.

European Site	Designated Feature Screened In	Distance from the Projects[3]	Rationale for Screening In
	Atlantic salt meadows (*Glauco Puccinellietalia maritima*).		
Annex II Migratory Fish			
River Derwent SAC (Site code: UK0030253)	**Annex II species that are a primary reason for selection of this site** River lamprey **Annex II species present as a qualifying feature, but not a primary reason for site selection** Sea lamprey	43km west of the landfall site (inland)	Individuals from the site may be disturbed/subject to mortality by potential UXO clearance in coastal waters.
Humber Estuary SAC (Site code: UK0030170)	**Annex II species present as a qualifying feature, but not a primary reason for site selection** Sea lamprey River lamprey	44km south of the export cable corridor	Individuals from the site may be disturbed/subject to mortality by potential UXO clearance in coastal waters.

European Site	Designated Feature Screened In	Distance from the Projects[3]	Rationale for Screening In
Annex II Marine Mammals			
Southern North Sea SAC (Site code: UK0030395)	Harbour porpoise	Within array areas and export cable corridor	This site is within the AoS of DBS, and will therefore be considered further in the HRA assessments.
Humber Estuary SAC (Site code: UK0030170)	Grey seal	44km	This site is within the AoS of the Projects, and will therefore be considered further in the HRA assessments.
Klaverbank SAC (Site code: NL2008002)	Harbour porpoise Harbour seal Grey seal	44km	Potential for connectivity. It is assumed that harbour porpoise, harbour seal and grey seal in the Project area, or areas of potential effect, could also have connectivity to the Project.
The Wash and North Norfolk Coast SAC	Harbour seal	103km	Potential for connectivity. It is assumed that harbour seal in the Project area, or areas of potential effect, could also have connectivity to the Project.
Berwickshire & North Northumberland Coast SAC	Grey seal	173km	Potential for connectivity. It is assumed that grey seal in the Project area, or areas of potential effect, could also have connectivity to the Project.

European Site	Designated Feature Screened In	Distance from the Projects[3]	Rationale for Screening In
Moray Firth SAC (Site code: UK0019808)	Bottlenose dolphin	440km	Potential connectivity with individuals from the Moray Firth population travelling down and foraging within/in the vicinity of the Projects offshore development area.
Marine Ornithological Features			
Flamborough and Filey Coast SPA (Site code: UK9006101)	Breeding seabirds	Within export cable corridor	SPA is adjacent to the export cable corridor and there is potential for connectivity for designated populations of breeding gannet, kittiwake, common guillemot, razorbill and puffin based on mean maximum foraging range (+ 1SD). Flamborough and Filey Coast colony specific maximum foraging ranges for gannet, kittiwake indicate connectivity. Tracking data shows connectivity for breeding gannets and kittiwakes from Bempton cliffs. There is potential for disturbance to breeding cormorant, shag and herring gull from operation & maintenance vessels. Uncertain proportions of the kittiwake, gannet, common guillemot, razorbill and puffin populations may migrate through DBS East and DBS West.

European Site	Designated Feature Screened In	Distance from the Projects[3]	Rationale for Screening In
Greater Wash SPA (Site code: UK9014041)	Non-breeding seabirds and breeding terns	Within export cable corridor	SPA has small amount of overlap with the export cable corridor and there is potential for disturbance to designated wintering red-throated diver and common scoter from cable installation activities and operation & maintenance vessels. Migration of non-breeding little gull from this SPA are likely to result in small numbers passing through the site during migration, but, given the proximity of the site to this SPA, further detailed assessment of this is appropriate.
Coquet Island SPA (Site code: UK9006031)	Breeding seabirds	194km	There is potential for connectivity for designated breeding assemblage features; fulmar, lesser black-backed gull, kittiwake and puffin based on mean maximum foraging range (+ 1SD), although tracking data for breeding kittiwakes from Coquet does not indicate connectivity. Uncertain proportions of the fulmar, lesser black-backed gull, kittiwake, herring gull and puffin populations likely migrate through DBS East and DBS West.

European Site	Designated Feature Screened In	Distance from the Projects[3]	Rationale for Screening In
Farne Islands SPA (Site code: UK9006021)	Breeding seabirds	210km	There is potential for connectivity for designated breeding assemblage features; kittiwake and puffin based on mean maximum foraging range (+ 1SD), although the Farne Islands colony-specific maximum foraging range of kittiwakes suggests no connectivity. Uncertain proportions of the kittiwake and puffin populations possibly migrate through DBS East and DBS West.
Outer Firth of Forth and St Andrews Bay Complex SPA (Site code: UK9020316)	Breeding seabirds	250km	There is potential for connectivity for designated breeding gannet, kittiwake and puffin based on mean maximum foraging range (+ 1SD). Uncertain proportions of gannet, kittiwake, herring gull common guillemot and puffin populations most likely migrate through DBS East and DBS West.
St Abbs Head to Fast Castle SPA (Site code: UK0030281)	Breeding seabirds	252km	There is potential for connectivity for designated breeding kittiwake based on mean maximum foraging range (+ 1SD), although the St Abb's Head colony-specific maximum foraging range of kittiwakes suggests no connectivity. Tracking data also shows no connectivity for breeding kittiwakes.

European Site	Designated Feature Screened In	Distance from the Projects[3]	Rationale for Screening In
			Uncertain proportions of the kittiwake, herring gull common guillemot and razorbill populations most likely migrate through DBS East and DBS West.
Forth Islands SPA (Site code: UK9004171)	Breeding seabirds	289km	There is potential for connectivity for designated breeding gannet and kittiwake based on mean maximum foraging range (+ 1SD). Bass Rock colony-specific maximum foraging ranges for gannet indicate connectivity, although Isle of May colony-specific maximum foraging ranges for kittiwake do not indicate connectivity. Tracking data shows potential connectivity for breeding gannets from Bass Rock and kittiwakes from Isle of May. Uncertain proportions of the kittiwake, gannet, lesser black-backed gull, common guillemot, razorbill and puffin populations most likely migrate through DBS East and DBS West.
Terrestrial Ecological Sites			
Humber Estuary SPA and Ramsar (Site code: UK0030170)	Breeding and non-breeding bird features	9km south of the onshore cable corridor	Land within/in the vicinity of the Projects onshore activities may be functionally linked with the SPA. As such construction activities may lead to impacts on foraging breeding/non-breeding species from the site.

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