BERWICK BANK WIND FARM

REPORT TO INFORM APPROPRIATE ASSESSMENT

APPENDIX 1A: STAGE 1 LSE SCREENING REPORT

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HRA Report – Appendix 1A
Final

The appendices to the Stage 1 LSE Screening Report are available online: Berwick Bank Wind Farm Offshore Stage 1 LSE Screening Report Appendices

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Term	Description
Appropriate Assessment	An assessment to determine the implications of a plan or project on a European site in view of that site's conservation objectives. An Appropriate Assessment forms part of the Habitats Regulations Appraisal (HRA) and is required when a plan or project (either alone or in combination with other plans or projects) is likely to have a significant effect on a European site.
Annex I Habitat	A natural habitat type of community interest, defined in Annex I of the Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (Habitats Directive). The designation of Special Areas of Conservation (SAC) is required in the UK to ensure the conservation of these habitats. The protection afforded to sites designated prior to EU Exit persists in UK law.
Annex II Species	Animal or plant species of community interest, defined in Annex II of the Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (Habitats Directive). The designation of Special Areas of Conservation (SAC) is required in the UK to ensure the conservation of these species. The protection afforded to sites designated prior to EU Exit persists in UK law.
Competent Authority	The term derives from the Habitats Regulations and relates to the exercise of the functions and duties under those Regulations. Competent authorities are defined in the Habitat Regulations as including "any Minister, government department, public or statutory undertaker, public body of any description or person holding a public office". In the context of a plan or project, the competent authority is the authority with the power or duty to determine whether or not the proposal can proceed (SNH, 2014).
EU Exit	The withdrawal of the United Kingdom from the European Union
European site	A Special Area of Conservation (SAC), or candidate SAC, (cSAC), a Special Protection Area (SPA), a site listed as a site of community importance (SCI), or, as per Scottish Planning policy (SPP), a possible SAC (pSAC) or potential SPA (pSPA). All Ramsar sites are also Natura 2000 sites (taken as European sites) and a protected under the relevant statutory regimes' (SPP, paragraph 211 (published in 2014 as confirmed by Scottish Government (2019))
Firth of Forth Zone	A suitable area for the development of offshore wind identified and assessed through a statutory process of Strategic Environmental Assessment (SEA) undertaken by the Department of Energy and Climate Change (DECC), now Department for Business, Energy and Industrial Strategy (BEIS).
Habitats Regulations	The Conservation (Natural Habitats, &c.) Regulations 1994, the Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species 2017.
Habitat Regulations Appraisal	A process required by the Habitats Regulations of identifying likely significant effects of a plan or project on a European site and (where Likely Significant Effects are predicted or cannot be discounted) carrying out an appropriate assessment to ascertain whether the plan or project will adversely affect the integrity of the European. If adverse effects on integrity cannot be ruled out, the latter stages of the process require consideration of the derogation provisions in the Habitats Regulations.
Likely Significant Effect	Any effect that may reasonably be predicted as a consequence of a plan or project that may affect the conservation objectives of the features for which the European site was designated, but excluding trivial or inconsequential effects. A likely effect is one that cannot be ruled out on the basis of objective information. A 'significant' effect is a test of whether a plan or project could undermine the site's conservation objectives (SNH, 2014).
Migratory waterbirds	Species of waders and waterfowl that are ecologically dependant on wetlands and which make regular migrations along the coast of the UK and/or non-breeding individuals that overwinter in the UK.
National Site Network	The National Site Network comprises Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) designated (or proposed) on EU Exit day and which formerly formed part of the Natura 2000 network. The term "national site network" is used in each of the Habitats Regulations and the terms refer to the same network of sites ((Scottish Government, 2020).
Natura 2000 network	A coherent European ecological network of Special Areas of Conservation and Special Protection Areas comprising sites located within European Union Member States.
Phase 1	Development of two offshore wind farms: Seagreen Alpha and Seagreen Bravo.
Proposed Development	All offshore infrastructure of the Berwick Bank Wind Farm, seaward of Mean High Water Springs (MHWS) which is the subject of this Screening Report.
Ramsar Site	Wetlands of international importance, designated under the Ramsar Convention.
Seabirds	Birds that spend most of their lives feeding and living on the open ocean, coming ashore only to breed.
Special Area of Conservation (SAC)	Special Areas of Conservation (SACs) are areas designated for the conservation of certain plant and animals species listed in the Directive.
Site of Community Importance (SCI)	Defined in the Habitats Directive as a site which, in the biogeographical region or regions to which it belongs, contributes significantly to the maintenance or restoration at a favourable conservation status of a natural habitat type in Annex I, or of a species in Annex II, of the Habitats Directive and may also contribute significantly to the coherence of the Natura 2000 network. The site may also contribute significantly to the maintenance of biological diversity within the biogeographic region or regions concerned. For animal species ranging over wide areas, SCIs shall correspond to the places within the natural range of such species which represent the physical or biological factors essential to their life and reproduction.
Special Protection Area (SPA)	Special Protection Areas (SPAs) are sites that are designated to protect rare or vulnerable birds (as listed on Annex I of the Directive 2009/147/EC on the conservation of wild birds), as well as regularly occurring migratory species.

ACRONYMS

Acronym	Description
AfL	Agreement for Lease
BBWL	Berwick Bank Wind Limited
BDMPS	Biologically Defined Minimum Population Scales
BEIS	Business, Energy and Industrial Strategy
CES	Crown Estate Scotland
CfD	Contract for Difference
CI	Confidence Interval
CJEU	The Court of Justice of the European Union
CL	Confidence Limit
cSAC	Candidate Special Area of Conservation
CTV	Crew Transfer Vessel
DDSFB	Dee District Salmon Fishery Board
DECC	Department of Energy and Climate Change
EEA	European Economic Area
EIA	Environmental Impact Assessment
EMF	Electromagnetic fields
EU	European Union
FCS	Favourable Conservation Status
FDSFB	Forth District Salmon Fisheries Board
FTOWDG	Forth and Tay Offshore Wind Developers Group
GW	Gigawatts
HAT	Highest Astronomical Tide
HDD	Horizontal Directional Drilling
HLV	Heavy Lift Vessel
HPDI	Highest Posterior Density Intervals
HRA	Habitat Regulations Appraisal
IMO	International Maritime Organization
INNS	Invasive Non-Indigenous Species
IROPI	Imperative Reasons of Overriding Public Interest
LAT	Lowest Astronomical Tide
LSE	Likely Significant Effect
MARPOL	The International Convention for the Prevention of Pollution from Ships
MCAA	Marine and Coastal Access Act
MHWS	Mean High Water Springs
MS-LOT	Marine Scotland Licensing Operations Team
MSS	Marine Scotland Science
MU	Management Unit
NEPS	National Electrofishing Programme for
NS	NatureScot
NSIP	Nationally Significant Infrastructure Projects
OSP	Offshore Substation Platform
OSPAR	Oslo-Paris
PAH	Polyarmomatic hydrocarbon
PCB	Polychlorinated biphenyl
PDE	Project Design Envelope
PEL	Probable Effect Level
PEMMP	Project Environmental Management and Monitoring Plan
pSAC	Possible Special Areas of Conservation
pSPA	Potential Special Protection Areas
PTS	Permanent Threshold Shift
RIAA	Report to Inform Appropriate Assessment
ROV	Remotely Operated Vehicle
RSPB	Royal Society for the Protection of Birds
RTC	River Tweed Commission
SAC	Special Area of Conservation
SCI	Site of Community Importance
SD	Standard Deviation
SEA	Strategic Environmental Assessment
SMA	Seal Management Area
SMP	Seabird Monitoring Programme
SNCB	Statutory nature conservation bodies
SNH	Scottish Natural Heritage (now NatureScot)
SOV	Service Operations Vessel
SPA	Special Protection Area
SPP	Scottish Planning Policy
SPT	Scottish Power Transmission
SSC	Suspended Sediment Concentrations
SSER	SSE Renewables
SWEL	Seagreen Wind Energy Limited
TBT	Tributyl tin
TCE	The Crown Estate
TEL	Threshold Effect Level
TP	Transition Piece
UK	United Kingdom
UXO	Unexploded Ordnance
ZDA	Zone Develeopment Agreement
ZOI	Zone of Influence

UNITS

Unit	Description
GW	Gigawatt
ha	Hectare
km	Kilometre
km^2	Square kilometre
m	Metre
m^2	Square metre
m^3	Cubic metre
mm	Millimetre
MW	Megawatt
nm	Nautical Mile

1. INTRODUCTION

1.1. OVERVIEW

1. SSE Renewables Developments (UK) Limited ("SSE Renewables" (SSER)) is proposing the development of the Berwick Bank Wind Farm (hereafter referred to as 'the Project'). The Project includes both offshore and onshore infrastructure required to generate and transmit electricity from the Array Area to a landfall point on the East Lothian and Scottish Borders coast (at either Thorntonloch or Skateraw Harbour) and a Scottish Power Transmission (SPT) 400kV Grid Substation located at Branxton, southeast of Torness Power station. SSER is also considering an additional offshore export cable corridor (ECC), which is under development. The additional ECC does not form part of the Proposed Development for this LSE Screening Report. The Array Area is located in the outer Firth of Forth and Firth of Tay, 33.5 km east of the East Lothian and the Scottish Borders coastline (St Abb's Head) from the nearest boundary and is the second project to be developed in the former Firth of Forth Zone (see Figure 1.1).

2. The initial Berwick Bank Wind Farm Proposal would have been one of two projects to be developed via Phase 2 of the former Firth of Forth Zone which included the initial Berwick Bank Wind Farm and Marr Bank Wind Farm. The initial Berwick Bank Wind Farm Proposal was proposed with a potential generating capacity of 2,300 MW and Marr Bank was due to have an approximate installed capacity of 1,850 MW. Marr Bank was to be located to the west of the initial Berwick Bank Wind Farm Proposal.

3. In October 2020, SSER consulted on a Habitats Regulations Appraisal (HRA) Screening Report for the initial Berwick Bank Wind Farm Proposal which was to be located approximately 39.2 km east of the East Lothian and Scottish Borders coastline from the nearest boundary with an array area of approximately 775 km^2. Advice on LSE Screening (as it pertained to the initial Berwick Bank Wind Farm Proposal) was received by SSER on 11 May 2021 (hereafter, this consultation process is referred to as the 'initial consultation'.

4. SSER subsequently undertook a detailed review of both the initial Berwick Bank and Marr Bank Wind Farm Proposal site environmental constraints and SSER has adjusted the consenting approach for the two Proposals and is now seeking consent for one Wind Farm Project: Berwick Bank Wind Farm. The offshore components seaward of mean high water springs (MHWS) of the Project are hereafter referred to as the Proposed Development. The boundary of the Proposed Development is a reduction of the combined boundaries of the initial Berwick Bank Proposed Development and Marr Bank Wind Farms. This revised Offshore HRA Screening Report has been developed for the Proposed Development and considers the new Proposed Development boundaries and updated Project Design Envelope (see section 3).

5. SSER will submit separate consents, licences and permissions for the offshore (seaward of Mean High Water Springs (MHWS) and onshore (landward of Mean Low Water Springs (MLWS)) infrastructure of the Project. A new Offshore EIA Scoping Report (SSE, 2021) has considered the Proposed Development.

6. The consents, licences and permissions that will be sought by SSER for the Proposed Development include:

   - a Section 36 consent under the Electricity Act 1989;
   - a marine licence under the Marine and Coastal Access Act (MCAA) 2009 for the generating assets located within the Array Area; and
   - a marine licence under the Marine and Coastal Access Act 2009 and the Marine (Scotland) Act 2010 for the transmission assets.

1.2. HABITATS REGULATIONS APPRAISAL

7. This document has been produced to inform the HRA process for the Proposed Development. It provides information to enable the screening of the Proposed Development with respect to its potential to have a likely significant effect (LSE) on designated nature conservation sites (hereafter 'European sites'). The scope of this document covers all relevant European sites and relevant qualifying interest features seaward of MHWS, and potential impacts of offshore and intertidal infrastructure seaward of MHWS on onshore sites landward of MLWS. European sites are proposed to be "screened out" where no LSE from the Proposed Development is predicted. Where LSE cannot be ruled out at this stage the European sites will be "screened in" and assessed further.

8. The requirement and process for the consideration of potential impacts of plans and projects on European sites have followed the European Union's (EU) Habitats Directive.[1] In Scottish territorial waters, the Habitats Directive was initially translated into specific legal obligations by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and the Conservation of Habitats and Species Regulations 2017 in respect of reserved matters. The Conservation of Offshore Marine Habitats and Species Regulations 2017 are also relevant in Scottish waters more than 12 nautical miles (nm) from land. These regulations are together referred to as the Habitats Regulations.

9. Following the United Kingdom's (UK) departure from the EU on 31 December 2020 (EU-Exit), 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 2. However, these changes are considered to have no material implications on the requirement or process for a HRA for the Berwick Bank Wind Farm. This report will hereafter refer to the 'Habitats Regulations' as including any changes enacted by the EU Exit Regulations.

10. 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).

11. In this report, and in accordance with EU Exit guidance issued by the Scottish Government the term "European site" has been retained to refer to the above sites protected in European Member States, Scotland and the rest of the UK (Scottish Government, 2020). However, where these sites are located in the UK, they now form part of the National Site Network. European sites are defined in full in section 2.1.36.

12. The European Commission's (2018) guidance, identifies a staged process to the assessment of the effects of plans or projects on European sites:

    i. Screening;

    ii. Appropriate Assessment;

[1] Council Directive 92/43 /EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ L 206/7 22.7.1992) (the Habitats Directive)

iii. Mitigation and alternatives; and

iv. Imperative Reasons of Overriding Public Interest (IROPI).

13. The guidance on conducting HRAs in Scotland (SNH, 2015) states that the requirements for assessments of the effects of plans or projects on European sites can be broken down into nine stages as follows:

1. Deciding whether a plan should be subject to Habitats Regulations Appraisal
2. Identifying the European sites that should be considered in the appraisal
3. Gathering information about the European sites
4. Discretionary discussions on the method and scope of the appraisal
5. Screening the draft / proposed plan for likely significant effects
6. Applying mitigation measures at screening stage to avoid likely significant effects
7. Rescreen the plan and decide on the need for appropriate assessment
8. The 'appropriate assessment' - site integrity, conservation objectives, consideration of in-combination effects and the precautionary principle
9. Amending the plan until there would be no adverse effects on site integrity
10. Preparing a draft of the Habitats Regulations Appraisal Record
11. Consultation
12. Proposed modifications
13. Modifying and completing the appraisal record.

1.3. HABITATS REGULATIONS APPRAISAL TO DATE

14. Advice on LSE Screening (as it pertained to the initial Berwick Bank Wind Farm Proposal) was received on 11 May 2021. The outcomes of this consultation are presented in section 1.7. This account of Screening for the Proposed Development builds upon the HRA Screening exercise completed in 2020 for the initial Berwick Bank Wind Farm Proposal and considers all responses received during consultation.

15. The Proposed Development is, however, considered afresh in this report as a proposal in its own right and information is provided herein to support the assessment of the specific proposals for the Berwick Bank Wind Farm as now proposed. The previous Advice on LSE Screening is only referred to where it is relevant to the details of the now proposed Berwick Bank Wind Farm. Where conclusions happen to be consistent with those made with respect to the initial Berwick Bank Wind Farm Proposals, these have been reached with detailed consideration to the Proposed Development, as well as relevant feedback. All distances informing connectivity (effect pathways) to HRA receptors have been taken from the edge of the revised boundary.

16. Further, this HRA Screening Report has been developed alongside the Proposed Development's Scoping Report as part of the Environmental Impact Assessment (EIA) process. Where design or supporting information or stakeholder feedback is common to both assessments this has been used, as referenced. The Offshore EIA Scoping Report for Berwick Bank Offshore Wind Farm was submitted to Marine Scotland and shared with consultees in the October 2021 (SSE, 2021) ahead of this report.

17. A HRA 'Change Report' highlighting the material changes to Berwick Bank Wind Farm since the last HRA Screening information was provided in October 2020 can be made available on request but is not considered a material consideration to this HRA Screening report.

[2] It is recognised that post EU-Exit, the UK parliament can amend the schedules to the Habitats Regulations

1.4. PURPOSE OF THIS REPORT

18. This document provides the information to support screening for LSE required by the Habitats Regulations. It comprises the screening stage and therefore provides information to enable the screening of the Proposed Development with respect to its potential to have an LSE on European sites.

19. Potential impacts of onshore components of the Project on onshore sites landward of MHWS, are outside the scope of this LSE Screening report. However, any potential impacts from offshore effects that could impact receptors onshore will be considered in this report. Any impacts from effect-sources onshore on offshore receptors (such as seabirds utilising intertidal or coastal resources) will be considered in the onshore LSE Screening report. The onshore components of the Project will also be considered as part of an in-combination assessment where relevant, and is considered to be a reasonably foreseeable project. This assessment will account for both concurrent and additive effects of the Project on receptors that traverse on and offshore areas.

20. The screening exercise presented in this report is based on the current understanding of the baseline environment and proposed activities associated with the Proposed Development and is based on the project and site-specific information currently available. Any changes which may arise as a result of further environmental surveys, assessment work, consultee responses, Road Map process for the Proposed Development, and/or refinements to the design of the Proposed Development will be reflected in the RIAA, and/or subsequent HRA reporting.

21. In summary, the purpose of this report is:

- to identify the relevant European sites which may include features (Annex I habitats, Annex I birds and Annex II species[2]) which may be sensitive or vulnerable to potential impacts arising from the construction, operation and maintenance and decommissioning of the Proposed Development;
- to consider the features of the relevant European sites and to identify those which are not considered likely to be at risk of significant effects arising from the Proposed Development, either alone or in combination with other plans or projects, so that they can be eliminated from further consideration within the HRA process;
- to consider the features of the relevant European sites and to identify those which are considered likely to be at risk of significant effects arising from the Proposed Development, either alone or in combination with other plans or projects, so that they can be taken forward for appropriate assessment; and
- to consider which of the potential impacts arising from the Proposed Development are considered likely to result in LSEs to features of European sites and which impacts can be eliminated from consideration in further stages of the HRA[3].

1.5. STRUCTURE OF THIS REPORT

22. This LSE screening report is set out in the following stages:

- section 2 – a brief summary of the HRA process and legislative context including implications of the UK's departure from the EU;
- section 3 – a description of the key elements of the Proposed Development;
- section 4 – the initial identification of sites and features which may potentially be affected by the Proposed Development;
- section 5 – LSE screening tables and the determination of the potential for LSEs to arise with regard to the designated features of the European sites under consideration; and

[3] Recognising the potential for non-significant effects to accumulate or act in-combination

- section 6 – a summary of the European sites and features for which the screening process has identified potential for LSEs.

1.6. PROJECT OVERVIEW

1.6.1. FIRTH OF FORTH ZONE

23. The Round 3 offshore wind development programme was instigated by The Crown Estate (TCE) in 2008. Suitable areas for the development of offshore wind were assessed through a statutory process of Strategic Environmental Assessment (SEA) undertaken by Department of Energy and Climate Change (DECC), now Department for Business, Energy and Industrial Strategy (BEIS). As part of a competitive tender, Seagreen Wind Energy Limited (SWEL) was awarded the exclusive rights to the development of the Firth of Forth Zone by TCE in 2010. The subsequent Zone Development Agreement (ZDA) between Seagreen Wind Energy Ltd and TCE provides the potential for the development of several offshore wind farms. Subsequently in 2019, the Firth of Forth ZDA was terminated, with Agreement for Leases (AfLs) now agreed with Crown Estate Scotland (CES) for Seagreen (consisting of Seagreen Alpha and Seagreen Bravo), Berwick Bank and Marr Bank (now being development as a single project known as Berwick Bank Wind Farm).

1.6.2. PHASE 1

24. Phase 1 within the former Firth of Forth Zone includes the development of two offshore wind farms: Seagreen Alpha and Seagreen Bravo (hereafter collectively referred to as Seagreen 1), located around 27 km from the Angus coastline (Figure 1.1), which have the potential combined capacity of up to 1,500 MWs. The offshore export cable for Seagreen 1 will make landfall at Carnoustie and connects to a substation at Tealing.

25. Offshore consent for Seagreen 1 was received in October 2014 from Scottish Ministers and was confirmed in November 2017 following a legal challenge by the Royal Society for the Protection of Birds (RSPB). A 15-year Contract for Difference (CfD) was awarded in September 2019 for 42% of the total project capacity (454 MW) and Seagreen 1 reached financial close in June 2020.

1.6.3. PHASE 2

26. Phase 2 of the former Firth of Forth Zone included the Initial Berwick Bank Wind Farm Proposal and the superseded Marr Bank Wind Farm Proposal.

1.6.4. THE PROPOSED DEVELOPMENT

Introduction

27. The Proposed Development could include up to 307 wind turbines and all associated offshore and onshore infrastructure, although as outlined in section 1.1, this LSE Screening information considers only the offshore components (up to MHWS) of the Proposed Development (including onshore impacts of offshore infrastructure).

28. The Proposed Development Array Area (i.e. the area in which the wind turbines will be located) is approximately 1,314 km^2 and is located approximately 33.5 km east of the East Lothian and Scottish Borders coastline from the nearest boundary (Figure 1.1). The Proposed Development Array Area is situated to the east of the large-scale morphological banks 'Marr Bank' and overlapping the 'Berwick Bank' in the south.

29. A maximum of 307 wind turbines will be installed in the Proposed Development Array Area, with either suction caisson jacket or piled jacket foundations proposed for the wind turbine foundations. There will be up to ten offshore substation platforms (OSPs) installed with piled jackets for the platform foundations. The wind turbines will connect to each other and to the OSP(s) via subsea inter-array cables, and the OSP(s) will be connected to other OSP(s) via interconnector cables.

30. Up to 12 offshore export cables will connect the OSP(s) to a landfall location on the East Lothian and Scottish Borders coast, either at Thorntonloch (hereafter referred to as 'Thorntonloch Landfall') or Skateraw Harbour (hereafter referred to as the 'Skateraw Landfall')'; see Figure 1.1. Once the cables make landfall, they will connect to the grid connection point at a new 400 kV Branxton substation, southwest of Torness Power station under an existing grid connection agreement.

31. The decommissioning process is likely to follow a similar programme to construction, in a reverse manner. SSER is seeking a 35-year consent period for operation of the Proposed Development.

Key Components of the Proposed Development

32. The key offshore components of the Proposed Development include:

- wind turbines;
- wind turbine foundations;
- array cables;
- interconnector cables;
- offshore substation(s) platform(s); and
- offshore export cable(s).

33. Further description of the key elements of the Proposed Development is provided in section 3.

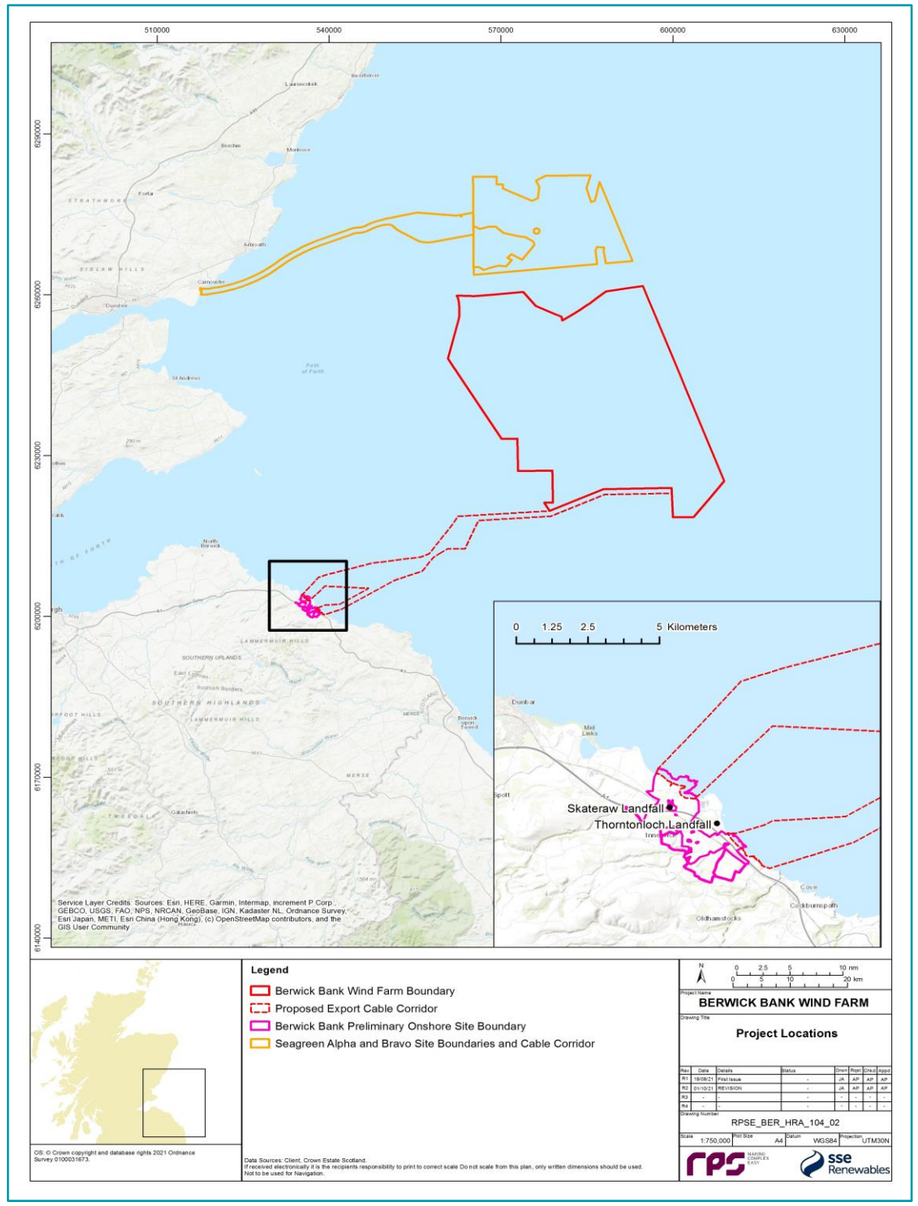


Figure 1.1: Location of the Proposed Development within the Former Firth of Forth Zone

1.7. RELEVANT CONSULTATIONS

34. The Initial consultation was undertaken with Marine Scotland Licensing Operations Team (MS-LOT), Marine Scotland Science (MSS) and Scottish Natural Heritage (SNH), acting under its operating name NatureScot (hereinafter referred to as NatureScot (NS)). Comments applicable to the LSE Screening for the Proposed Development have been taken into consideration in this LSE Screening Report. A summary of the details of the consultation undertaken to date is presented in Table 1.1; where consultees raised similar points, these have been grouped.

Table 1.1: Summary of Key Consultation on LSE Screening for the Proposed Development (Including Relevant Information from the Initial Berwick Bank Wind Farm Proposal LSE Screening Response)

Date	Consultee	Type of Consultation	Summary of Consultation	Where Addressed
Overarching				
30 June 2020	MS-LOT, MSS, SNH	Teleconference	Pre-scoping meeting which included presentation of the approach to the LSE screening and confirmation that it will be a single report including consideration of designated sites for ornithology, marine mammals, fish and shellfish and benthic ecology. Nationally/locally designated sites and the relevant qualifying features screened will be fully considered and assessed in the relevant Offshore EIA Report chapter. Programme for submission of Berwick Bank LSE Screening for stakeholder review is September 2020.	This report follows the same approach and includes designated sites for ornithology, marine mammals, fish and shellfish and benthic ecology.
11 May 2020	MS-LOT	Screening response on the Initial Berwick Bank Wind Farm Proposal LSE Screening Report.	The HRA must fully align with the impact pathways identified for assessment in the scoping opinion adopted by the Scottish Ministers in relation to the Proposed Development, dated 9th March 2021.	Updated throughout section 5.
14 December 2020	NatureScot	Screening response on the Initial Berwick Bank Wind Farm Proposal LSE Screening Report.	Issues with report formatting and viewing embedded hyprelinks	Report reformatted to A3 and all hyper-links checked and updated.
Benthic ecology				

Date	Consultee	Type of Consultation	Summary of Consultation	Where Addressed
11 May 2020	MS-LOT/MSS	Screening response on the Initial Berwick Bank Wind Farm Proposal LSE Screening Report.	In agreement with the conclusions regarding impact pathways and LSE on Annex I habitat features at the Berwickshire and Northumberland Coast SAC.	Noted.
20 January 2020	MSS	Screening response on the Initial Berwick Bank Wind Farm Proposal LSE Screening Report.	Agree that the impacts that should be screened in are: changes in physical processes; increases in SSC and sediment deposition but only for the export cable corridor during all phases; risk of accidental pollution during construction; and in-combination effects during all phases.	Noted.
			Changes in prey availability that may arise during all phases of development, as a result of colonisation of hard structures and the aggregration of fish and shellfish, should be considered for the potential to impact features of some SACs (marine mammals) and SPAs (seabirds).	Noted and impacts to prey species of marine mammals are considered in paragraph 5.4.3.278 *et seq*., and prey sepecies of seabirds in paragraph 5.5.2.312.
			EMF effects should be considered. MSS acknowledge that it may not be possible to carry out a full quantitative assessment of EMF emitted from export and inter-array cables on behaviour of prey species.	It is understood that this comment related to potential floating foundations (and the emission of EMF to the water column). Floating foundations are no longer proposed. See section 3 (Project Description). In relation to fixed foundations, this impact considered in section 5.2.3, however, given the localised nature of EMF effects and that there is no spatial overlap between the Proposed Development and the Berwickshire and North Northumberland Coast SAC, there is considered to be no Source-Pathway-Receptor link and no potential for LSE on Annex I habitats. EMF effects on fish, as prey species of marine mammals and seabirds, is considered in paragraphs 278 *et seq*. and paragraph 312, respectively.

Date	Consultee	Type of Consultation	Summary of Consultation	Where Addressed
Diadromous fish				
30 June 2020	MS-LOT, MSS, SNH	Teleconference	Pre-scoping meeting. MSS raised queries regarding which SACs will be incuded for Atlantic salmon and highlighted that consideration also needs to be given to rivers across the Proposed Development boundary, including the River Tweed SAC. SNH stated that it is unclear which salmon are going back to which natal rivers, so whilst it is possible to state which SACs are closest geographically, evidence cannot be provided as to whether salmon are going to particular protected sites. Therefore, SNH expect the assessment at LSE and EIA stages to be qualitative rather than quantitative.	Further clarity (and supporting evidence) is provided in section 4.2 regarding European site identification for migratory fish features for inclusion in the HRA. Ultimately in this screening, LSE could not be discounted for a number of sites, including the River Tweed SAC (Table 5.5) which will be explored in the RIAA. As discussed in section 4.2 European SACs are not selected on the basis of being closest geographically, rather, the selection was informed by the best avaiable evidence on migratory behaviour.
15 July 2020	MS-LOT, MSS, SNH	Letter response to proposed benthic survey specification	Several rivers which discharge in the vicinity, including the South Esk, Tay, Teith and Tweed, support major populations of diadromous fish, such as salmon, sea trout, eel and sea lamprey, which may migrate through or otherwise use the Proposed Development area. It is probable that aspects of construction and operation will have the potential to impact on diadromous fish.	Noted.
11 May 2021, 20 May 2021, 14 December 2020	MS-LOT/MSS/ NatureScot	Screening response on the Initial Berwick Bank Wind Farm Proposal LSE Screening Report.	An arbitrary cut off (100 km) should not be used to screen out SACs for diadromous fish distant from the development site. All SACs should be screened in where there is a potential impact mechanism, regardless of the distance. Agree with the six sites screened in but advise that there may be others which should be screened in.	Noted and the justification for sites included in the initial screening of sites for Annex II diadromous fish has been revised; see paragraph 4.2.2.108.
	MS-LOT		The SACs identified and selected in the HRA Screening Report as being screened in are agreed, with the exception of the Tweed Estuary SAC, which can be screened out.	Noted, sites screened-in are aligned with this response as they relate to the current proposals as set out in section 4.2.

Date	Consultee	Type of Consultation	Summary of Consultation	Where Addressed
	MS-LOT/ NatureScot		Atlantic salmon must be assessed within the HRA process and not just within the EIA.	Noted.
	MS-LOT/MSS		Impacts on other qualifying diadromous species such as river and sea lamprey, can be screened out of the HRA and should instead be considered through the EIA Report. In this regard, Atlantic salmon is not a qualifying interest of the Tweed Estuary SAC.	These comments are noted, however a lack of evidence relating to the possible connectiveity of the Proposed Development with lamprey is not conisdered to be consistent with the precautionary principle which should be applied at all stages in the HRA process. On this basis, lamprey species will be considered in both the HRA and EIA.
	MSS		Lack of overlap between development site and SACs is insufficient justification to exclude impact pathways associated with temporary habitat loss/disturbance and long-term habitat loss.	Noted and additional justifications have been included in section 5.3.
	MSS		Further justification is requied to exclude increased SSC as a potential impact mechanism.	Noted and additional justifications have been included in section 5.3.
	NatureScot		Key impacts to be considered for diadromous fish (Atlantic salmon): • Underwater noise (sound pressure) – during the pre-construction phase particularly in relation to any UXO clearance. Construction phase e.g. vessel movement, foundation installation especially piling, drilling etc. Operation and maintenance phases where there is any noisy maintenance works and potentially operational noise depending on windfarm type (fixed or floating) and decommissioning activities. • Underwater noise (particle motion) - as above. • EMF – consideration is required of both the export cable and cables within the windfarm site. This should also consider any differences of inter-array cables between fixed and floating wind turbine generators.	Noted and these impacts have been screened in for diadromous fish. It should be noted that floating foundations do not form part of the design envelope for the Proposed Development.
	MSS/ NatureScot		Consideration required of whether the physical presence of the structures may affect predator-prey relationships and result in potential impacts to diadromous fish during construction and operation.	Noted and effects of the presence of physical structures is considered in section 5.3.3.
15 January 2021	Dee District Salmon Fishery Board (DDSFB)		Updates provided on the recent assessments of salmon stocks in the Dee.	Noted and information considered in the baseline description in paragraph 195 and will be detailed in full in the RIAA.
			Concern regarding cumulative imapcts with other offshore wind farms on the east coast.	In-combination effects have been screened in for diadromous fish species (see section 5.3.3).
			The risk of increased predation, if the fish aggregate around the turbines, should be considered.	Noted and effects of the presence of physical structures is considered in section 5.3.3.
15 January 2021, 17th December 2020	DDSFB and Fisheries Management Scotland		Broadly agree with the assessments made in section 5.3, and support the assessment that underwater noise, EMFs, accidental pollution and in-combination effects cannot be discounted as likely significant effects for the Dee SAC.	Noted. Potential LSE has been identified for both features of this SAC with respect to underwater noise, EMFs, accidental pollution and in-combination effects.
			Do not consider that temporary, habitat loss or disturbance can be screened out at this stage for Dee SAC.	Further justification to support screening this impact out is presented in section 5.3.3.
			Concern that the wind farm may act as 'artificial island' that migratory fish chose to avoid due to visual disturbance. This visual disturbance relates to highly dynamic image of turbine blades (known as 'shadow flicker'), as represented in the surface window.	MSS advised MS-LOT, in the EIA Scoping Opinion for the Initial Berwick Bank Wind Farm Proposal, that there is insufficient information for visual impacts of turbine blades to be scoped in as a separate topic, and the mechanisms and implications of impact are speculative and unclear. On this basis, this impact has not been considered within this LSE Screening.
15 January 2021	Forth District Salmon Fisheries Board (FDSFB)		The risk of increased predation, if the fish aggregate around the turbines, should be considered.	Noted and effects of the presence of physical structures is considered in section 5.3.3.

Date	Consultee	Type of Consultation	Summary of Consultation	Where Addressed
15 January 2021	River Tweed Commission (RTC)		Reference to changes to the run-timing of adult salmon returning to the Tweed SAC.	Noted and information considered in the baseline description in paragraph 190 and will be detailed in full in the RIAA.
Marine mammals				
11 May 2020	MSLOT	Screening response on the Initial Berwick Bank Wind Farm Proposal LSE Screening Reets chaport.	Agree that direct effects from EMF, and operational noise can be screened out.	Noted and these impact pathways have been screened out in section 5.4.
11 May 2020, 20 May 2021, 14 December 2020	MSLOT, MSS, NatureScot		Advise that vessel collision risk and accidental pollution can be screened out.	Noted and these impact pathways have been screened out in section 5.4.
			The in combination effects identified in the HRA Screening Report are agreed and screened in.	Noted.
			Underwater noise from vessels and changes to prey availability should be screened in for all three marine mammal species associated with the four European Sites located in Scottish waters for all phases.	Noted and these impact pathways have been screened in, in section 5.4.
			Consideration of the impacts from pre-construction activities including unexploded ordnance clearance, some geophysical activities and the in combination effects of these must be considered in the HRA.	Noted and these impact pathways have been screened in, in section 5.4.
20 May 2021, 14 December 2020	MSS, NatureScot	Screening response on the Initial Berwick Bank Wind Farm Proposal LSE Screening Report.	Agree with the four SACs in Scottish waters that have been screened in.	Noted
			Agree that underwater noise from pile driving and in-combination effects should be screened in. Agree that changes inw ater clarity, operational noise and EMF can be screened out.	Noted.
			Highlight inconsistencies in the site numbering for transboundary sites.	Noted and the numbering of the transboundary sites has been updated.
			Updates to the bottlenose dolphin abundance estimates and latest seal usage maps.	Text in paragraph 220 has been updated and Figure 5.1 shows the latest at-sea usage maps.
14 December 2020	NatureScot	Screening response on the Initial Berwick Bank Wind Farm Proposal LSE	Clarifications over seal haul-out sites. Confirmation that, given the distance between the Fast Castle haul-out site and the landfalllocations, it is unlikely that	Text in paragraph 249 relating to haul-out sites has been updated.

Date	Consultee	Type of Consultation	Summary of Consultation	Where Addressed
		Screening Report.	construction works at landfall or activities associated with cable installation are likely to affect any individual hauled out using this site.	
4 February 2021	Natural England	Screening response on the Initial Berwick Bank Wind Farm Proposal LSE Screening Report.	The appropriate SACs and potential impacts on them have been taken forward for consideration of LSE.	Noted.
Ornithology				
18 December 2019	Marine Scotland, SNH	Teleconference	Advised that revised guidance relating to foraging ranges for breeding seabirds was due to be published (Woodward *et al.,* 2019).	Potential connectivity of SPA (and Ramsar site) seabird populations with the Proposed Development during the breeidng season is determined on the basis of the foraging range estimates in Woodward *et al.* (2019).
2 June 2020	Marine Scotland, SNH	Teleconference	Seabird breeding colony surveys for the Seabirds Count census are complete for east coast sites and data are available through the Seabird Monitoring Programme (SMP) online database. Outputs of the assessment will be the ornithology chapter, with various technical annexes on assessments and the HRA report. The Woodward *et al.,* (2019) report on foraging ranges would lead to a larger long list but could be informed by the proposed interim baseline report due in Q4 2020 which would reduce LSE requirements. SSER reviewed the feasibility within the programme of the Proposed Development to delay LSE screening submission until after production of the interim baseline report and has decided to proceed earlier as planned because there would not be sufficient time in the programme to accommodate a later submission of the LSE screening report to after the publication of the interim baseline report.	Noted. The LSE screening considers all relevant seabird species as well as other ornithology features on which there is potential for effects. It is not limited to the five key seabird species that were highlighted here by Marine Scotland and SNH.

Date	Consultee	Type of Consultation	Summary of Consultation	Where Addressed
			Noted to consider larger gulls in the assessment as well as five key species: gannet, kittiwake, guillemot, razorbill and puffin.	

2. HABITAT REGULATIONS PROCESS

2.1. LEGISLATIVE CONTEXT

35. The Habitats Directive (92/43/EEC), on the conservation of natural habitats and of wild fauna and flora, protects habitats and species of European nature conservation importance. Together with Council Directive (2009/147/EC) on the conservation of wild birds (the 'Birds Directive'), the Directive provides the European Union's legal framework for the protection of wild fauna and flora and birds.

36. The UK is no longer an EU Member State. Notwithstanding, the Habitats Directive (and transposing Habitats Regulations, as set out in section 1.2) continue to provide the legislative backdrop for HRA in the UK through the EU Exit Regulations. The HRA process implemented under the Habitats Regulations continues to apply (subject to minor changes effected by the EU Exit Regulations) and the UK is bound by HRA judgments handed down by The Court of Justice of the European Union (CJEU) prior 31 to December 2020[4]. This document has therefore been drafted on the basis that all relevant HRA-related legislation remains in place and in accordance with Habitats Regulations that transposed the European requirements for HRA into UK law (see section 1.2) and as effected by the EU Exit Regulations (2019). The objective of the Habitats Regulations is to conserve, at a favourable conservation status (FCS), those habitats and species listed in Annexes I and II of the Habitats Directive and Annex I of the Wild Birds Directive. Post EU-Exit, the Habitats Regulations continue to refer to Annexes I and II of the Habitats Directive and Annex I of the Birds Directive and as such, reference is made to the annexes of the Habitats and Birds Directives in this report.

2.2. EUROPEAN SITES POST EU EXIT

37. 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.

38. Following EU-Exit, 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.

2.3. THE PROCESS

39. Although the UK no longer has any obligations under the Nature Directives, the wording of Article 6(3) and 6(4) of the Habitats Directive underlies the sequential decision-making tests applied under the HRA process to plans or projects likely to affect European sites.

40. Neither the Habitats Directive, or the Habitats Regulations explicitly define the assessment process to be followed to test the potential effects of plans and projects on European sites. However. HRA is generally recognised as a progressive, four stage process built around the wording of Article 6(3) of the Habitats Directive, with the outcome at each stage defining the requirement for and scope of the next. Compliance with the requirements of the Directive can be demonstrated if the stages are followed in the correct and particular sequence. These stages are summarised in Figure 2.1.

41. This report considers the first 'screening for LSE' step in the HRA process which encompasses stages 1 to 3 in Figure 2.1.

42. The Habitat Regulations make it clear that the person applying for the consent of the plan or project must provide such information as the Competent Authority may reasonably require for the purposes of the assessment. It is intended that this report and the subsequent HRA reporting including the RIAA provides this information.

43. To determine whether an appropriate assessment is required it must first be ascertained whether or not the plan/project, directly connected with or necessary to the management of the site. As this is not the case for the Proposed Development, it must therefore be determined whether the plan or project, either alone or in-combination with other plans and projects, is likely to have a significant effect on a European site(s). This constitutes the LSE screening stage which removes from the assessment protected features of European sites which have no connectivity to the Proposed Development or those where the impacts are immaterial or inconsequential and the conservation objectives for the site's qualifying interests would not be undermined (i.e. they are non-significant). All other European sites, including those where there is reasonable doubt as to the magnitude and nature of the relevant impact(s), are passed through to the next stage (appropriate assessment).

44. The 2019 Regulations establish management objectives for the national site network. These are called the network objectives[5]. The objectives in relation to the National Site Network are to:

- i) maintain or restore certain habitats and species listed in the Habitats Directive to favourable conservation status (FCS); and
- ii) contribute to ensuring the survival and reproduction of certain species of wild bird in their area of distribution and to maintaining their populations at levels which correspond to ecological, scientific and cultural requirements, while taking account of economic and recreational requirements.

[4] The UK Supreme Court may depart from binding pre-EU Exit case law if they consider it 'right to do so' and the Inner House of the Court of Session may depart from such case law in certain circumstances

[5] See: Changes to the Habitats Regulations 2017 - GOV.UK (www.gov.uk)

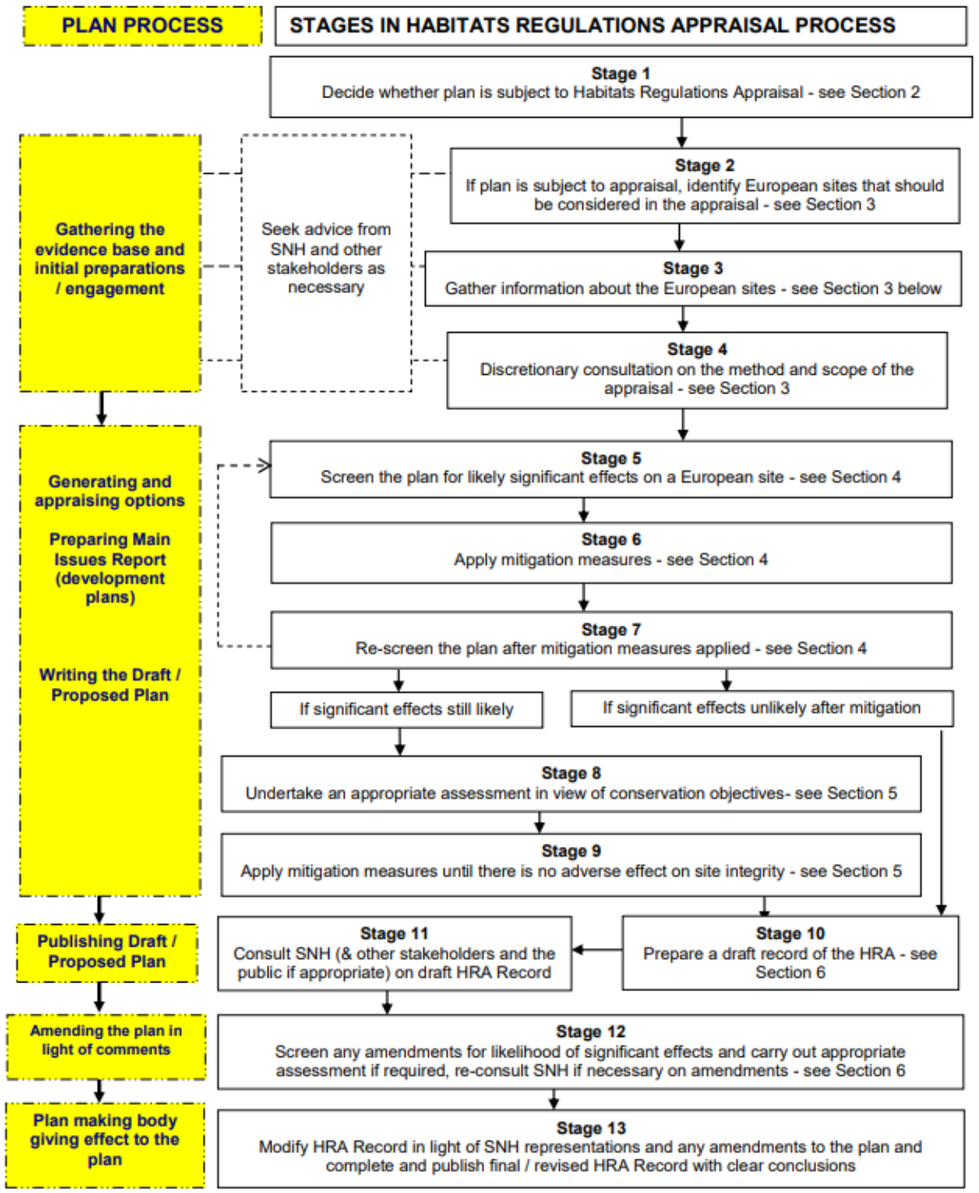


Figure 2.1: Stages in the Habitats Regulations Appraisal Process (taken from SNH, 2015)

2.4. PROCESS FOR IDENTIFYING EUROPEAN SITES AND FEATURES

45. To facilitate the identification of the European sites and features to be considered in the LSE screening for the Proposed Development, a pre-screening of sites has been undertaken. This is considered to be appropriate due to the large spatial scale of the Proposed Development, the wide ranging nature of many of the features of European sites which may be affected (i.e. birds and marine mammals) and therefore the number of European sites which could potentially be affected.

46. The criteria adopted for the initial identification of European sites are outlined in Table 2.1. This approach takes account of the location of the European sites (including Ramsar Sites) in relation to the Proposed Development, the anticipated zone of influence (ZOI) of potential impacts associated with the Proposed Development, and the ecology and distribution of qualifying interest features.

47. Table 2.1 outlines the order of consideration given to the criteria used for the identification of the list of sites to be taken forward for determination of LSE. Initial consideration is given to whether there is a physical overlap between the Proposed Development and any European sites; all sites with an overlapping boundary are screened in to be taken forward for determination of LSE.

48. Pre-screening criterion 2 next identifies any European sites, not already screened in using criterion 1, where there is an overlap between the Proposed Development and the range of any qualifying mobile species of the site. All sites where the Proposed Development boundary overlaps with the range of one (or more) of its features, are taken forward for determination of LSE.

49. Criterion 3 identifies any European sites, not already screened in by criterion 1 or 2, where the potential ZOI of the Proposed Development overlaps with a European site and/or qualifying interests of the site (as per section 4). For ornithology receptors, consideration is also given to a range of factors that inform the likely extent to which the different qualifying features will occur on the Proposed Development site (e.g. scarcity of records of the relevant species during the baseline surveys (see section 4.4).

Table 2.1: Criteria for Initial Identification of Relevant European Sites

Order of Consideration	Criteria Used for Initial Identification of Relevant European Sites
1	The site boundaries of the Proposed Development overlap with one or more European sites.
2	European or Ramsar site 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 Proposed Development.
3	European sites and/or qualifying interest features located within the potential ZOI of impacts associated with the Proposed Development (e.g. habitat loss/disturbance, noise and risk of collision).

50. The outcome of this initial screening will be that sites where there is no potential for LSEs due to lack of potential overlap of receptor-impact pathway to occur are excluded from further consideration in this report. Sites not excluded on the basis of any of the criteria outlined in Table 2.1 (i.e. where there is a potential for a receptor-impact pathway to occur) will be taken forward for determination of LSE in section 5.

3. PROJECT DESCRIPTION

3.1. INTRODUCTION

51. This section of the Berwick Bank LSE Screening Report provides an outline description of the Proposed Development and describes the activities likely to be associated with the construction, operation, and maintenance, and decommissioning of the Proposed Development. It summarises the design and components of the Proposed Development infrastructure, based on conceptual design information and refinement of the Proposed Development parameters following receipt of the Offshore EIA Scoping Opinion for the initial Berwick Bank Wind Farm Proposal, and understanding of the environment from site specific survey and desk-top analysis.

52. The Project Design Envelope (PDE) approach (also known as the Rochdale Envelope approach) will be adopted for the assessment of the Proposed Development, in accordance with current good practice and the "Rochdale Envelope Principle". The PDE concept allows for some flexibility in project design options, particularly for foundations and wind turbine type, where the full details of a project are not known at application submission.

53. The Proposed Development is located 33.5 km offshore of the East Lothian and Scottish Borders coastline and within the south eastern extent the former Firth of Forth Zone. The Proposed Development array area comprises an area of approximately 1,341 km^2.

54. Up to twelve offshore export cables will connect the OSP(s) to landfall at one selected landfall location on the East Lothian. Two are being considered, one at Thorntonloch (hereafter referred to as 'Thorntonloch Landfall') and one at Skateraw Harbour (hereafter referred to as the 'Skateraw Landfall')'. Once the cables make landfall, they will connect to the grid connection point at a new 400 kV Branxton substation, southwest of Torness Power station under an existing grid connection agreement. A potential offshore Export Cable Corridor (ECC) has also been identified as shown in Figure 1.1.

3.2. PROPOSED BOUNDARY

55. An AfL allows SSER to carry out investigations, such as survey activities, to identify the potential design within the Proposed Development Array Area for the wind farm by understanding environmental sensitivities that may exist, in advance of submitting the consent application. The Proposed Development Array Area includes the majority of the previous Marr Bank Wind Farm and initial Berwick Bank Wind Farm AfL areas.

56. The Proposed Development Array Area is the area within which the offshore infrastructure, such as the wind turbines, offshore substation(s), array cables and the start of the proposed ECC will be located.

57. The Proposed Development offshore ECC has been identified and will connect the Proposed Development Array Area to the Thorntonloch Landfall or Skateraw Landfall.

58. The Proposed Development boundary is illustrated within Figure 1.1. This area encompasses the:

- Array Area: This is where the offshore wind farm will be located, which will include the wind turbines, wind turbine foundations, array cables, and a range of offshore substations and offshore interconnector cables; and
- ECC: This is where the offshore electrical infrastructure, such as the offshore export cable(s), will be located.

3.3. OFFSHORE INFRASTRUCTURE

59. The key offshore components of the Proposed Development are likely to include:

- up to 307 wind turbines (each comprising a tower section, nacelle and three rotor blades) and associated support structures and foundations);
- up to ten OSPs and associated support structures and foundations;
- estimated scour protection of 2 km^2);
- a network of inter-array cabling linking the individual wind turbines to each other and to the OSPs, plus inter-connections between substations (approximately 1,225 km of array cabling and 94 km of interconnector cabling); and
- up to twelve offshore export cables connecting the offshore substation(s) to the onshore substation.

3.3.2. WIND TURBINES

60. The Proposed Development will be comprised of up to 307 wind turbines, and the final number of wind turbines will be dependent on the capacity of individual wind turbines used and also environmental and engineering survey results. There is the potential for a reduced number of wind turbines to be used if an increased output of wind turbine model is selected when the final project design is developed.

61. The maximum rotor blade diameter is expected to be no greater than 310 m, with a maximum blade tip height of 355 m above Lowest Astronomical Tide (LAT) and a minimum blade tip height of 37 m above LAT. The top of the wind turbines (the nacelle) will be approximately 200 m above LAT. A scheme for wind turbine lighting and navigation marking will be agreed with consultees post-application. The minimum distance between the bottom of the blade and the water surface will be 37 m.

62. The layout of the wind turbines will be developed to best utilise both the available wind resource and suitability of seabed conditions, while ensuring environmental effects and impacts on other marine users (such as fisheries and shipping routes) are minimised. The final layout of the wind turbine array will be confirmed at the final design stage (post-application).

63. The maximum design scenario for wind turbines is presented in Table 3.1.

Table 3.1: Design Envelope for Wind Turbines

Parameter	Maximum Design Envelope
Maximum number of wind turbines	307
Range of wind turbines capacity (MW)	14 - 24
Maximum rotor blade diameter (m)	310
Maximum nacelle height (m above LAT)	200
Minimum height of lowest blade tip above LAT (m)	37
Maximum blade tip height above LAT (m)	355

3.3.3. WIND TURBINE FOUNDATIONS AND SUPPORT STRUCTURES

64. The wind turbines will be fixed to the seabed by foundation structures. To allow for flexibility in foundation choice, two wind turbine support structures and foundations are being considered for the Proposed Development - piled jacket and suction caisson jacket.

65. There is the potential for seabed preparation to be required for each foundation type, which may include seabed levelling and removing surface and subsurface debris such as (for example) boulders, fishing nets, unexploded ordnance or lost anchors. Excavation may be required to access and remove any debris which is present below the seabed surface.

66. Foundations will be fabricated off-site, stored at a suitable port facility (if required) and transported to site as needed. Specialist vessels will be needed to transport and install foundations. Scour protection (typically rock) may be required on the seabed and will be installed either before and/or after foundation installation.

67. All foundation types and maximum parameters stated in the following section are for wind turbines only; foundation structures for OSPs are discussed in section 3.3.5.

Piled Jacket Foundations

68. Piled jacket foundations are formed of a steel lattice construction (comprising tubular steel members and welded joints) secured to the seabed by driven and/or drilled pin piles attached to the jacket feet. The hollow steel pin piles are typically driven or drilled into the seabed relying on the frictional and end bearing properties of the seabed for support.

69. The maximum design scenario for piled jacket foundations with pin piles is shown in Table 3.2.

Table 3.2: Design Envelope for Jacket Foundation with Pin Piles

Parameter	Maximum Design Envelope
Number of jacket foundations	307
Maximum number of legs per jacket foundation	4
Leg diameter (m)	5
Number of pin piles per leg (max)	2
Foundation footprint (per jacket) (m^2) including scour protection	15,241
Maximum hammer energy (kJ)	4,000
Realistic average hammer energy (kJ)	3,000
Jacket leg spacing (at seabed) (assumed three leg) (m)	60
Diameter of pin piles (m)	5.5

Suction Caisson Jacket Foundations

70. Suction caisson jacket foundations are formed with a steel lattice construction (comprising tubular steel members and welded joints) fixed to the seabed by suction caissons installed below each leg of the jacket. The suction caissons are typically hollow steel cylinders, capped at the upper end, which are fitted underneath the legs of the jacket structure. They do not require a hammer or drill for installation.

71. The foundations will be transported to site via sea. Once at site, the jacket foundation will be lifted by the installation vessel using a crane and lowered towards the seabed in a controlled manner. When the steel caisson reaches the seabed, a pipe running up through the stem above each caisson will suck water out of each bucket. The buckets are pressed down into the seabed by the resulting suction force. When the bucket has penetrated the seabed to the desired depth, the pump is turned off. A thin layer of grout is then injected under the bucket to fill the air gap and ensure contact between the soil within the bucket, and the top of the bucket itself.

72. The maximum design scenario for jacket foundations with suction caissons is provided in Table 3.3.

Table 3.3: Design Envelope for Suction Caisson Jacket Foundations

Parameter	Maximum Design Envelope
Number of jackets with suction buckets	307
Maximum number of legs per jacket with suction caisson	4
Total seabed footprint + scour protection (m^2) (Per Foundation)	31,416
Suction bucket diameter (m^2)	20
Expected penetration depth (m)	20
Jacket leg spacing (at seabed) (assumed three leg) (m)	60
Diameter of jacket leg (m)	5

3.3.4. SCOUR PROTECTION FOR FOUNDATIONS

73. Foundation structures for wind turbines and substations are at risk of seabed erosion and 'scour hole' formation due to natural hydrodynamic and sedimentary processes. The development of scour holes is influenced by the shape of the foundation structure, seabed sedimentology and site specific metocean conditions such as waves, currents and storms. Scour protection may be employed to mitigate scour around foundations. There are several commonly used scour protection types, such as:

- concrete mattresses: several metres wide and long, cast of articulated concrete blocks which are linked by a polypropylene rope lattice which are placed on and/or around structures to stabilise the seabed and inhibit erosion;
- rock placement: either layers of graded stones placed on and/or around structures to inhibit erosion or rock filled mesh fibre bags which adopt the shape of the seabed/structure as they are lowered on to it; or
- artificial fronds: mats typically several metres wide and long, composed of continuous lines of overlapping buoyant polypropylene fronds that create a drag barrier which prevents sediment in their vicinity being transported away. The frond lines are secured to a polyester webbing mesh base that is itself secured to the seabed by a weighted perimeter or anchors pre-attached to the mesh base.

74. The most frequently used scour protection method is 'rock placement', which entails the placement of large quantities of crushed rock around the base of the foundation structure.

75. The amount of scour protection required will vary for the different foundation types being considered for the Proposed Development. The final choice of scour protection will be made after design of the foundation structure, taking into account a range of aspects including geotechnical data, meteorological and oceanographical data, water depth, foundation type, maintenance strategy and cost.

3.3.5. OFFSHORE PLATFORMS

76. The Proposed Development may require up to a total of ten offshore platforms. These offshore platforms will be utilised as OSPs which transform electricity generated by the wind turbines to a higher voltage, thereby allowing the power to be efficiently transmitted to shore. The size of the platform topsides will depend on the final electrical set up for the wind farm but could range between 35 – 100 m (length) by 27 – 80 m (width), and approximately 45 – 80 m in height (above LAT), excluding the helideck or lightning protection.

77. The platform locations have not yet been selected and will be identified through detailed design consideration. The offshore platforms will be installed with piled jacket foundations.

78. The maximum design scenario for the offshore platforms is described in Table 3.4.

Table 3.4: Design Envelope for Offshore Platforms

Parameter	Maximum Design Envelope
Maximum number of offshore platforms	10
Length of topside (m)	35 - 100
Width of topside (m)	27 - 80
Height (excluding helideck or lightning protection) (LAT) (m)	45 - 80

Offshore Platform Foundations: Piled Jacket

79. A description of piled jacket foundations, such as those which will be used for offshore platforms, is provided earlier in this section for wind turbines (see section 3.3.3). The maximum design scenario for jacket foundations with pin piles for offshore platforms is shown in Table 3.5.

Table 3.5: Design Envelope for Jacket Foundations with Pin Piles for Offshore Platforms

Parameter	Maximum Design Envelope
Number of piled jacket foundations	10
Maximum number of legs	8
Maximum leg diameter (m)	5
Maximum number of piles per structure	32
Maximum pin pile diameter (m)	4
Maximum hammer energy (kJ)	4,000

3.3.6. INTER-ARRAY CABLES

80. Inter-array cables carry the electrical current produced by the wind turbines to an offshore substation. A small number of wind turbines will typically be grouped together on the same cable 'string' connecting those wind turbines to the substation, and multiple cable 'strings' will connect back to each offshore substation.

81. The inter-array cables will be buried where possible and protected with a hard-protective layer (such as rock or concrete mattresses) where burial is not achievable, for example where crossing pre-existing cables, pipelines or exposed bedrock. If cable protection is required, the protection measure will be dependent on several factors such as seabed conditions, seabed sedimentology and the physical processes. The cable installation methodology and potential cable protection measures will be finalised at the final design stage (post-application).

82. The maximum design scenario for inter-array cables is presented in Table 3.6.

Table 3.6: Design Envelope for Inter-array Cables

Parameter	Maximum Design Envelope
Total cable length (km)	1,225
Cable diameter (mm)	250
Cable installation methodology	Jet trencher / mechanic trencher / cable plough
Minimum cable burial depth (m)	0.5 - 3
Maximum width of cable trench (m)	2
Maximum width of seabed affected by installation per cable (m)	15
Maximum area of seabed disturbance (km^2)	18.4

3.3.7. OFFSHORE TRANSMISSION INFRASTRUCTURE

Offshore Export Cables

83. Offshore export cables are used for the transfer of power from the offshore substations to the point of landfall. The offshore export cables will have a maximum total length of 1,072 km, comprised of up to twelve cables. Each of these offshore export cables will be installed in a trench of up to 2 m wide with a burial depth of between 0.5 m and 3 m per cable. There is the potential for seabed preparation to be required prior to cable installation, with methods such as jet trencher, mechanical trencher or grapnel currently being considered.

84. Although an ECC has been identified, the exact locations of the offshore export cables are yet to be determined and will be based upon geophysical and geotechnical survey information, which will also support the decision on requirements for any additional cable protection. Flexibility is required in the location, depth of burial and protection measures for the offshore export cables to ensure physical and technical constraints, changes in available technology and project economics can be accommodated within the final design.

85. Likewise, SSER is currently considering the feasibility of two landfall locations: Skateraw and Thorntonloch. One will be selected. The installation of the export cables through the intertidal zone at the Skateraw or Thorntonloch landfalls will depend on pre-construction confirmation of ground conditions however one of the following methods of installation will be implemented and the HRA will consider both:

- trenchless installation: installation of the offshore export cable via trenchless installation methods such as Horizontal Directional Drilling (HDD) or Direct Pipe®; or
- open cut trench: this method involves the excavation of a trench on the shore via earth moving equipment. The cable is then pulled ashore into the trench and the trench is backfilled and then re-instated.

86. If the cables at landfall are installed using a trenchless technique, designed in measures will avoid exposure.

87. The maximum design scenario for the offshore transmission infrastructure is described in Table 3.7.

Table 3.7: Design Envelope for Offshore Export Cables

Parameter	Maximum Design Envelope
Maximum number of export cables	12
Maximum total cable length (km)	1,072
Maximum cable diameter (mm)	260
Cable installation methodologies – seaward of MLWS	Jet trencher / mechanic trencher / cable plough
Cable installation methodologies – landward of MLWS	Trenchless installations or open cut trench
Minimum cable burial depth (m)	0.5 - 3
Maximum width of cable trench (m)	2
Maximum width of seabed affected by installation per cable (m)	15
Maximum area of seabed disturbed (km^2)	16

3.4. OFFSHORE CONSTRUCTION PROGRAMME

88. The maximum duration of the offshore construction phase of the Proposed Development is up to four years in line with the general construction series outlined below:

1. pre-construction surveys and activities (including unexploded ordnance (UXO) clearance, geophysical and geotechnical surveys);
2. foundation installation;
3. OSP topside installation/commissioning;
4. inter-array cable installation
5. offshore export cable installation; and
6. wind turbine installation/commissioning.

89. The offshore construction phase will be supported by various vessels including jack-up or floating Heavy Lift Vessels (HLVs), support vessels, cable lay vessels, pre-lay survey vessels, Remotely Operated Vehicles (ROVs) deployment vessels, rock installation vessels, service and commissioning support vessels, and guard vessels.

90. Wind turbines, foundation structures and offshore platform structures will be transported from the pre-assembly harbour where sub-assemblies (nacelle, rotor blades and towers) will be loaded onto an installation vessel or support vessel. At the installation location, the wind turbine tower will be erected first, followed by the nacelle and blades. The blades may be installed one at a time or may be pre-assembled. Following installation of the wind turbine and connection to the necessary cabling, a process of testing and commissioning will be undertaken.

3.5. OPERATION AND MAINTENANCE PHASE

91. Operations and maintenance works will be conducted from either a Service Operations Vessel (SOV), helicopter, drones or Crew Transfer Vessel (CTV) for routine operations and maintenance works, as well as heavy lift vessels and/or jack-up vessels for infrequent major maintenance campaigns. The details of estimated annual and total operations and maintenance activities will be detailed within the Design Envelope of the Offshore EIAR and the RIAA.

3.6. DECOMMISSIONING PHASE

92. Under Section 105 of the Energy Act 2004 (as amended), developers of offshore renewable energy projects are required to prepare a decommissioning programme for approval by Scottish Minsters. A Section 105 notice is issued to developers by the regulator after consent or marine licence has been issued for the given development. Developers are then required to submit a detailed plan for the decommissioning works, including anticipated costs and financial securities. The plan will consider good industry practice, guidance and legislation relating to decommissioning at that time. The plan will be consulted on by an approved set of stakeholders and will be publicly available. MS-LOT will further consult on the plan, the costs and financial securities prior to seeking ministerial approval.

4. IDENTIFICATION OF EUROPEAN SITES AND FEATURES

93. This section provides a list of European sites (including Ramsar Sites), and their features, for which there is the potential for connectivity with the Proposed Development, using the criteria outlined in Table 2.1, and therefore those which should be taken forward for consideration of LSE in section 5.

94. Each of the following receptor groups are considered in turn:

- Annex I habitats (subtidal and coastal up to MHWS): section 4.1;
- Annex II diadromous fish species: section 4.2;
- Annex II marine mammals: section 4.3; and
- Annex I marine and intertidal ornithological features: section 4.4.

4.1. SITES DESIGNATED FOR ANNEX I HABITATS

95. The following section details the results of the stepwise process to identify the European sites with relevant Annex I habitats (offshore and coastal) to be taken forward for detailed determination of LSE based on the methodology and criteria outlined in section 2.4 and Table 2.1.

96. The approach adopted for this LSE screening report focusses on the Annex I benthic habitat qualifying interest features for which there is considered to be a potential for impact as a result of the Proposed Development. Whilst pathways to individual features are identified, the consideration for the HRA is acknowledged to be for the integrity of the European site as a whole.

4.1.2. INITIAL IDENTIFICATION OF SITES

Criterion 1

97. Criterion 1 for the identification of European or Ramsar sites to be taken forward for consideration of LSE considers those sites which overlap with the boundaries of the Proposed Development. As there are no European sites with relevant qualifying Annex I habitats, up to MHWS, which overlap with the Proposed Development, no sites are screened in for further consideration on the basis of this criterion.

Criterion 2

98. Criterion 2 considers European or Ramsar sites with qualifying mobile features/species whose range (e.g. foraging, migratory, overwintering, breeding or natural habitat range) overlaps with the Proposed Development. There are no European sites which meet this criterion for Annex I benthic habitats and so no sites are screened in for further consideration on this basis.

Criterion 3

99. Criterion 3 considers European or Ramsar sites and/or qualifying interest features which are located within the potential ZOI of impacts associated with the Proposed Development. There is the potential for indirect effects to sites designated for Annex I habitats as a result of impacts associated with increased suspended sediment concentrations (SSC) arising from construction activities or from changes to the hydrodynamic regime as a result of the presence of offshore infrastructure associated with the Proposed Development. The extent of these impacts is considered likely to extend beyond the boundaries of the Proposed Development.

100. The ZOI for such indirect effects is typically defined from the outputs of physical processes modelling to determine, for example, the fate of sediments resuspended during the construction process. Physical processes modelling will be undertaken for the Proposed Development to inform the EIA and RIAA; however this has not been carried out at LSE Screening stage. Therefore, a buffer of one mean tidal excursion has been used to inform this area, which applies a reasonable and suitable level of precaution. One mean tidal excursion in the vicinity of the Proposed Development equates to approximately 6.5 km, as derived from the Atlas of UK Marine Renewable Energy Resources (ABPmer, 2008). For the purposes of LSE screening, a precautionary approach has been adopted and this buffer has been increased to 20 km. This buffer is considered to be sufficiently precautionary to capture all sites likely to be in the ZOI from indirect effects associated with construction activities. On the basis of this criterion, a single site, the Berwickshire and North Northumberland SAC, is identified and screened in for consideration of LSE in section 5.

4.1.3. SUMMARY OF INITIAL SCREENING OF SITES FOR ANNEX I HABITATS

101. The initial screening process has identified a single European site, the Berwickshire and North Northumberland SAC (see Table 4.1 and Figure 4.1), to be taken forward for determination of LSE in section 5.2 of this report. The Natura 2000 standard data forms[6] for all sites are provided in Appendix 1.

102. Effects on benthic habitats from activities within the Proposed Development array area across all phases are screened out on the basis of the distance of the Proposed Development array area from the site (30.1 km). Effects are only likely to arise from works along the proposed offshore ECC.

Table 4.1: European Sites Designated for Annex I habitats (Subtidal and Coastal) Taken Forward for Determination of LSE

European Site	Relevant Annex I Habitat Features	Distance to the Proposed Development Array Area (km)	Distance to the ECC (km)
Berwickshire and North Northumberland Coast SAC[1]	• Mudflats and sandflats not covered by seawater at low tide • Large shallow inlets and bays • Reefs • Submerged or partially submerged sea caves	30.1	3.0

[1] The marine mammals (grey seal) which are also qualifying features of this site are considered in Table 4.3.

[6] The titles of these documents have not, at the time of writing, been updated to reflect post EU Exit terminology

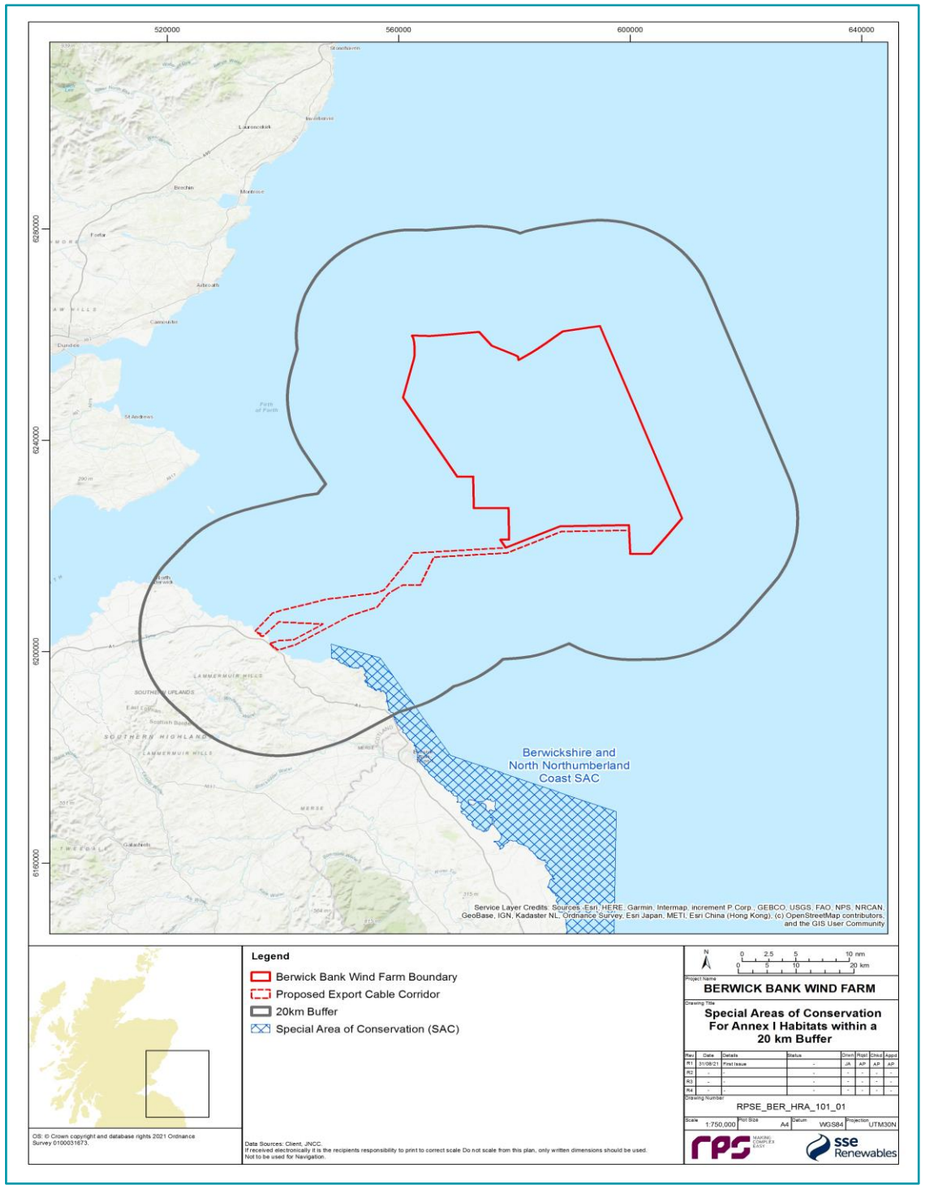


Figure 4.1: Location of European Sites Designated for Annex I Habitats to be Taken Forward for Determination of LSE

4.2. SITES DESIGNATED FOR ANNEX II DIADROMOUS FISH

103. The following sections detail the results of the stepwise process to identify the European sites with relevant Annex II diadromous fish species to be taken forward for detailed determination of LSE based on the methodology and criteria outlined in section 2.4 and Table 2.1.

104. The approach adopted for this LSE screening report focusses on the Annex II diadromous fish qualifying interest features for which there is considered to be a potential for impact as a result of the Proposed Development. Whilst pathways to individual features are identified, the consideration for the HRA is acknowledged to be for the integrity of the European site as a whole.

4.2.2. INITIAL IDENTIFICATION OF SITES

Criterion 1

105. Criterion 1 considers European or Ramsar sites which overlap with the boundaries of the Proposed Development. As there are no European sites with Annex II diadromous fish species as qualifying features which overlap with the Proposed Development, no sites are screened in for further consideration for diadromous fish on the basis of this criterion.

106. Criterion 2

107. Criterion 2 considers European or Ramsar sites with qualifying mobile features/species whose range (e.g. foraging, migratory, overwintering, breeding or natural habitat range) overlaps with the Proposed Development.

108. There is the potential for activities associated with the construction, operation and maintenance and decommissioning of the Proposed Development to result in impacts on Annex II diadromous fish species at a distance from the European sites for which they are qualifying interest features on the basis that these species are mobile and utilise both freshwater and marine environments throughout their life cycles. A precautionary approach to the identification of relevant sites has been adopted in order to capture all sites with the potential for connectivity with the Proposed Development, and in particular to consider the potential for disruption to migration (i.e. barriers to migration) of Atlantic salmon to/from natal rivers. On this basis, all SACs for Atlantic salmon located south of Fraserburgh and the Moray Firth have been screened in and all sites north of this, and within the Moray Firth itself, have been screened out. With respect to Atlantic salmon smolts, this is considered to be appropriate on the basis that recent evidence (Newton *et al.,* 2017; Gardiner *et al.,* 2018a) from the Moray Firth suggests that smolts migrating from rivers in the Moray Firth head north and directly across the North Sea relatively rapidly, rather than moving in a coastal direction upon leaving their natal rivers. Similar evidence of a rapid easterly migration out into the North Sea has also been shown for the River Dee in Aberdeenshire (Gardiner *et al.,* 2018b). There is therefore no basis for a LSE to result for those rivers flowing into the Moray Firth and the Proposed Development.

109. With respect to adult Atlantic salmon, the latest evidence indicates that adult migration to natal rivers in the Moray Firth is most likely from the north (TCE, 2019), so the risk of the Proposed Development causing a barrier to adults migrating towards the Moray Firth is very low. It should also be noted that there are no SACs designated for Atlantic salmon on the east coast of England.

110. As acknowledged in the screening response received from MSS and NatureScot on the Initial Berwick Bank Wind Farm Proposal LSE Screening Report, there is little information on their spatial distribution of

lamprey species out with estuaries. The area considered for Atlantic salmon, as discussed above, is however also considered to be suitably precautionary for sea and river lamprey.

111. On this basis, a total of six European sites have been screened in using this criterion (Figure 4.2) and must, therefore, be taken forward for determination of LSE in section 5.3. These are:

- Tweed Estuary SAC;
- River Tweed SAC;
- River South Esk SAC;
- River Tay SAC;
- River Dee SAC; and
- River Teith SAC.

Criterion 3

112. Criterion 3 considers European or Ramsar sites and/or qualifying interest features which are located within the potential ZOI of impacts associated with the Proposed Development (e.g. habitat loss/disturbance, noise and risk of collision). Given the large buffer proposed for criterion 2 above (100 km), the ZOI for key impacts to migratory fish species (i.e. underwater noise, habitat loss and increased SSC) are anticipated to be well within this range. No additional European sites with Annex II diadromous fish as qualifying features, beyond those already identified for criterion 2, are therefore screened in for further consideration on the basis of criterion 3.

4.2.3. SUMMARY OF INITIAL SCREENING OF SITES FOR ANNEX II DIADROMOUS FISH

113. The initial screening process has identified six European sites with Annex II diadromous fish species as qualifying features to be taken forward for detailed determination of LSE in section 5.3 of this report. The sites are listed in Table 4.2 and illustrated in Figure 4.2. The Natura 2000 standard data forms for all sites are provided in Appendix 1.

Table 4.2: European Sites Designated for Annex II Diadromous Fish Species Taken Forward for Determination of LSE

European Site	Relevant Annex II Features	Distance to the Proposed Development Area (km)*	Distance to the ECC Array (km)*
Tweed Estuary SAC[1]	• Sea lamprey (*Petromyzon marinus*) • River lamprey (*Lampetra fluviatilis*)	42.0	29.0
River Tweed SAC [1, 2]	• Atlantic salmon (*Salmo salar*) • Sea lamprey (*Petromyzon marinus*) • River lamprey (*Lampetra fluviatilis*)	46.6	33.6
River South Esk SAC	• Atlantic salmon (*Salmo salar*) • Freshwater pearl mussel (*Margaritifera margaritifera*) [3]	44.5	79.0
River Tay SAC [1, 2, 4]	• Atlantic salmon (*Salmo salar*) • Sea lamprey (*Petromyzon marinus*) • River lamprey (*Lampetra fluviatilis*)	82.8	90.4
River Dee SAC [4]	• Atlantic salmon (*Salmo salar*)	74.5	114.5
River Teith SAC [2]	• Freshwater pearl mussel (*Margaritifera margaritifera*) [3] • Atlantic salmon (*Salmo salar*) • Sea lamprey (*Petromyzon marinus*) • River lamprey (*Lampetra fluviatilis*)	137.2	103.9

[*] All distances are measured as the marine route to the site (i.e. not the distance as the crow flies).
[1] All other qualifying Annex I habitat features of this SAC have been screened out of further assessment on the basis that they are outside the ZOI for diadromous fish and there will be no receptor-impact pathway.
[2] Site is also designated for brook lamprey *Lampetra planeri*, but as this is not a diadromous fish species (i.e. it is confined to the freshwater section of the river and does not migrate to the marine environment) there is no potential for connectivity with the Proposed Development and this feature is screened out.
[3] Although the freshwater pearl mussel is not a diadromous fish, Atlantic salmon are host species during a critical parasitic phase of the mussel's lifecycle. There could therefore, be an indirect impact upon the freshwater pearl mussel feature of the site if the salmon population is adversely affected.
[4] Site is also designated for otter *Lutra lutra,* but given the distance of the site from the Proposed Development, there is no receptor-impact pathway and this feature is screened out.

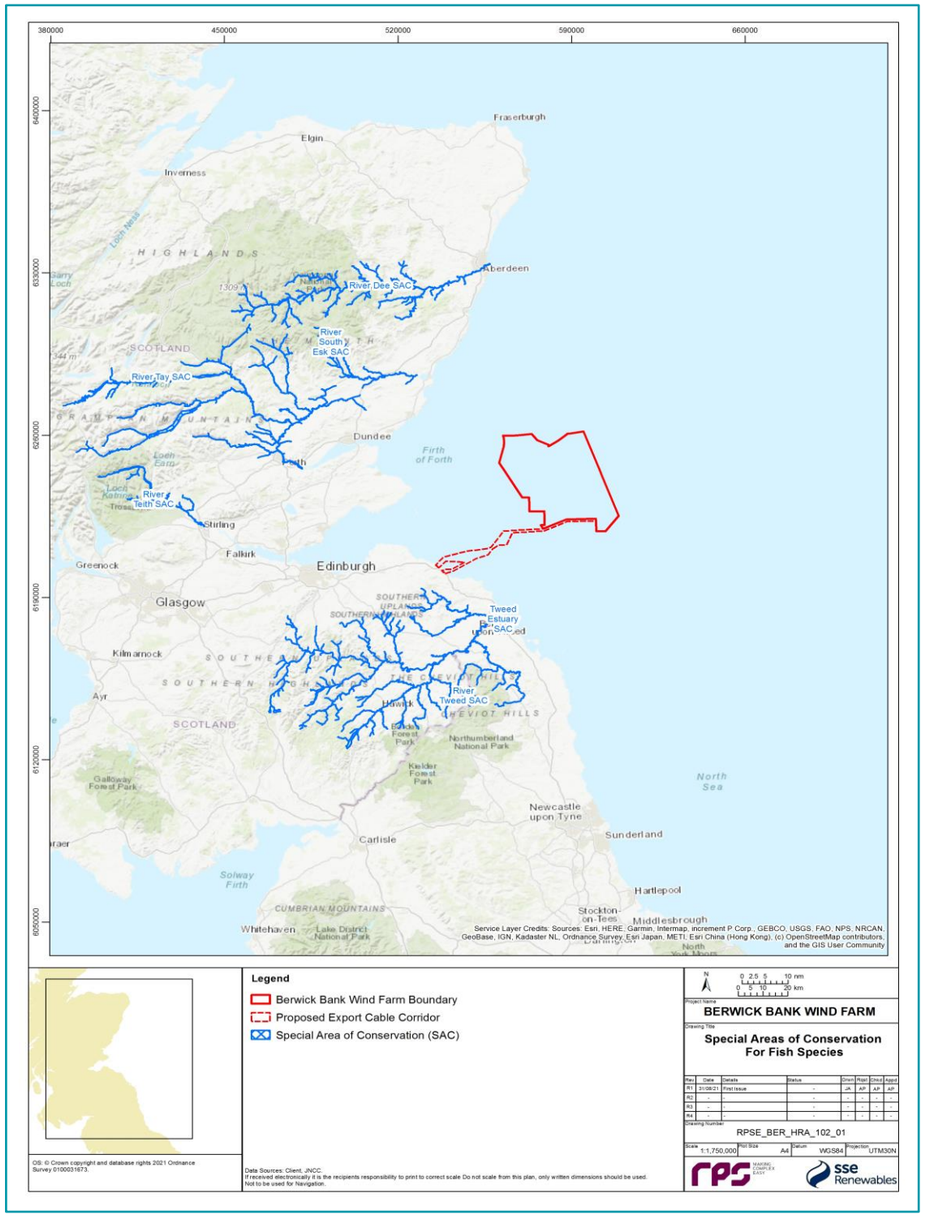


Figure 4.2: Location of European Sites Designated for Annex II Diadromous Fish Species Taken Forward for Determination of LSE

4.3. SITES DESIGNATED FOR ANNEX II MARINE MAMMALS

114. Based on data collected to date during aerial surveys for the Proposed Development, the Annex II marine mammal species likely to occur in the vicinity of the Proposed Development and therefore considered in the LSE screening are:

- harbour porpoise (*Phocoena phocoena*);
- bottlenose dolphin (*Tursiops truncatus*);
- grey seal (*Halichoerus grypus*); and
- harbour seal (*Phoca vitulina*).

115. This section does not consider European otter *Lutra lutra*; as there is considered to be no potential for impacts as a result of offshore works. This species will be covered by the separate HRA process for the onshore elements (landward of MLWS) of the Proposed Development, should it be required.

4.3.1. INITIAL IDENTIFICATION OF SITES

116. The following sections detail the results of the stepwise process to identify the European sites with relevant Annex II marine mammals as qualifying features to be taken forward for detailed determination of LSE based on the methodology and criteria outlined in section 2.4 and Table 2.1.

117. The approach adopted for this LSE screening report focusses on the Annex II marine mammal qualifying interest features for which there is considered to be a potential for impact as a result of the Proposed Development. Whilst only these qualifying interest features have been screened in for further consideration in section 5, it is acknowledged that the Competent Authority must undertake the LSE screening, and any subsequent appropriate assessment, at the site level and not for individual qualifying interest features.

Criterion 1

118. Criterion 1 considers European or Ramsar sites which overlap with the boundaries of the Proposed Development. There are no sites with Annex II marine mammal species as qualifying features which overlap with the Proposed Development, therefore no sites are screened in for further consideration for marine mammals on the basis of this criterion.

Criterion 2

119. Criterion 2 considers European or Ramsar sites with qualifying mobile species whose range (e.g. foraging, migratory, overwintering, breeding or natural habitat range) overlaps with the Proposed Development. There is the potential for activities associated with the construction, operation and maintenance and decommissioning of the Proposed Development to result in impacts on Annex II marine mammal species at distance from the sites for which they are qualifying interest features on the basis that these are highly mobile species which potentially forage over wide areas. The relevant ranges for the different marine mammal receptors are discussed in the following paragraphs.

<u>Cetaceans</u>

120. A precautionary approach to the identification of relevant sites for cetaceans (i.e. harbour porpoise and bottlenose dolphin) has been adopted in order to capture all sites with the potential for connectivity with the Proposed Development based on criterion 2. On this basis, it has been considered that sites with harbour porpoise and/or bottlenose dolphin as qualifying interest features which are located within a buffer that equates to the regional marine mammal study area, as defined in the Offshore EIA Scoping Report

for the Proposed Development (SSE, 2021) (recently confirmed via the Road Map process) could potentially be affected and must therefore, be taken forward for determination of LSE in section 5.4 of this report. In accordance with advice received during consultation (Initial Berwick Bank Wind Farm Proposal Offshore EIA Scoping Opinion, 2020), the Regional Marine Mammal Study Areas will be informed by species Management Units (MU): cetacean MUs are defined by the Inter Agency Marine Mammal Working Group (IAMMWG, 2015). The regional marine mammal study area incorporates the region encompassed by the northern North Sea biogeographic region and extending east to encompass the coastline and waters of the Netherlands, Germany, Denmark and Sweden, as shown in Figure 4.3.

121. All European sites within the regional marine mammal study area, where harbour porpoise or bottlenose dolphin are listed as a qualifying interest feature of the site, have been considered. A total of 20 European sites for harbour porpoise and a single site for bottlenose dolphin have been screened in using this criterion (see Table 4.3).

Harbour Seal

122. All SACs designated for harbour seal located within the same Seal MU (SCOS, 2020) as the Proposed Development (the East Scotland MU) will be considered by the screening. As the Proposed Development is adjacent to the North-East England MU, connectivity to SACs within this unit has also been considered. In addition, a screening range has been applied to identify sites for inclusion in the assessment of LSE for harbour seal which is based on a combination of the typical foraging range of this species and telemetry data available from harbour seals tagged by SMRU in the East Scotland Seal Management Area (SMA) between 2001 and 2008 (Sparling *et al.,* 2012; see Appendix 2). Harbour seals tend to make relatively short foraging trips from haul out sites and the latest Special Committee on Seal (SCOS) report (SCOS, 2020) states that harbour seals typically forage at distances of 40 to 50 km from haul out sites. Telemetry data for the harbour seals tagged in the East Scotland SMA, and specifically those tagged in the Eden Estuary, demonstrates that whilst harbour seal movements are mostly coastal with little overlap with the Proposed Development, there is some connectivity between the Proposed Development and the Firth of Tay and Eden Estuary SAC (Sparling *et al.,* 2012; see Appendix 2). As this SAC is approximately 62 km from the Proposed Development array area there is the possibility that seals in the area may forage at distances greater than 40-50 km. Therefore, in order to adopt a precautionary approach to the initial screening of sites for harbour seal, a screening range of 100 km has been applied for this species. Although some individuals do occasionally make longer trips, these are often associated with young animals dispersing from sites and are therefore not considered to indicate likely repeated connectivity between European sites and the Proposed Development.

123. Data from seals tagged in UK, Dutch and Danish waters (e.g. Tougaard *et al.,* 2008) suggest there is limited dispersal or mixing of harbour seals within these parts of the North Sea coastline and whilst a lack of movement by tagged individuals does not exclude the potential for mixing between subpopulations, it does support the conclusion that there is little or no potential for connectivity between harbour seals using the Proposed Development and European sites along the Dutch, German, Danish and Swedish coastlines.

124. The screening process for harbour seal includes any European site where the species is considered as a qualifying feature. A single European site for harbour seal has been screened in using this criterion (see Table 4.3).

Grey Seal

125. All SACs designated for grey seals located within the same Seal MU (SCOS, 2020) as the Proposed Development (the East Scotland MU) will be considered by the screening. As the Proposed Development is adjacent to the North-East England MU, connectivity to SACs within this unit has also been considered. Two European sites were identified as sharing the East Scotland MU (Berwickshire and North Northumberland Coast SAC and the Isle of May SAC). Berwickshire and North Northumberland Coast SAC straddles both relevant MUs, but no additional sites were identified for the Screening (i.e. within the North-East England MU. A screening range of 100 km has also been adopted to identify sites with grey seal as a qualifying feature for inclusion in the assessment of LSE, which is based on the latest advice regarding the typical foraging range of this species from haul out sites (SCOC, 2018). No additional sites were identified within this range. Therefore, a total of two European sites for grey seal have been identified for consideration at LSE screening (see Table 4.3).

Criterion 3

126. Criterion 3 considers European sites and/or qualifying interest features which are located within the potential ZOI of impacts associated with the Proposed Development (e.g. habitat loss/disturbance, noise and risk of collision). Given the large buffers proposed above for both cetaceans and pinnipeds in criterion 2, the ZOI for key impacts to marine mammals (i.e. underwater noise and changes to prey species) are anticipated to be well within this area. No additional European sites have marine mammal species as qualifying features, beyond those already identified for criterion 2; therefore no additional sites have been screened in for further consideration on the basis of this criterion.

4.3.2. SUMMARY OF INITIAL SCREENING OF SITES FOR ANNEX II MARINE MAMMALS

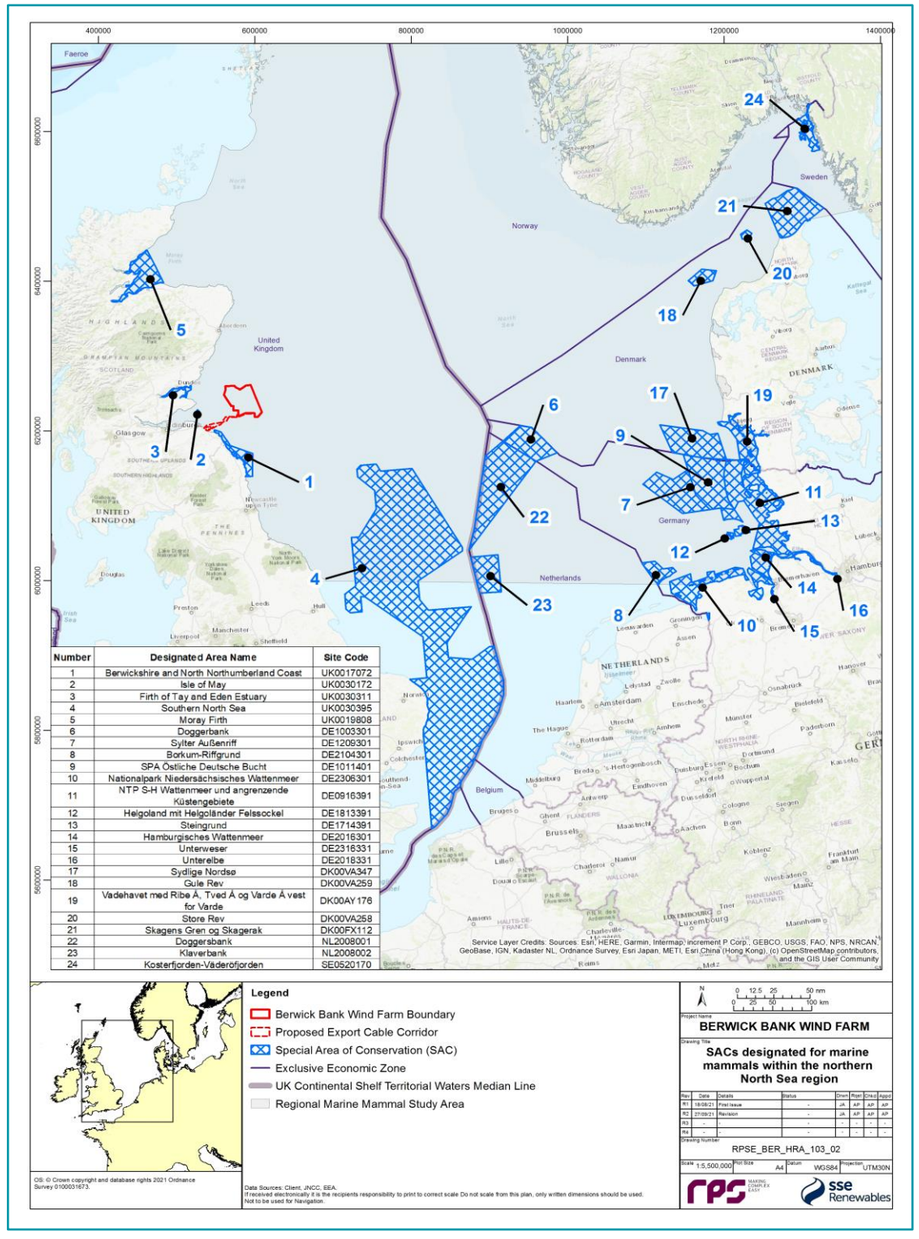
127. The initial screening process has identified 24 European sites with Annex II marine mammals as qualifying features to be taken forward for detailed determination of LSE in section 5.4 of this report. The sites are listed in Table 4.3 and shown in Figure 4.3. The Natura 2000 standard data forms for all sites are provided in Appendix 1.

Table 4.3: European Sites Designated for Annex II Marine Mammals Species Taken Forward for Determination of LSE

ID	European Site	Site Code	Relevant Annex II Features	Distance to the Proposed Development Array Area (km)*	Distance to the ECC (km)*
United Kingdom					
1	Berwickshire and North Northumberland Coast SAC[1]	UK0017072	Grey seal (*Halichoerus grypus*)	30.1	3.0
2	Isle of May SAC[2]	UK0030172	Grey seal (*Halichoerus grypus*)	38.5	20.9
3	Firth of Tay and Eden Estuary SAC[2]	UK0030311	Harbour seal (*Phoca vitulina*)	42.5	51.7
4	Southern North Sea SAC	UK0030395	Harbour porpoise (*Phocoena phocoena*)	144	151
5	Moray Firth SAC[2]	UK0019808	Bottlenose dolphin (*Tursiops truncatus*)	224	261
Germany					

ID	European Site	Site Code	Relevant Features	Annex II	Distance to the Proposed Development Array Area (km)*	Distance to the ECC (km)*
6	Doggerbank SCI[2,3]	DE1003301	Harbour porpoise (*Phocoena phocoena*)		311	320
7	Sylter Außenriff SCI[2,3,4]	DE1209301	Harbour porpoise (*Phocoena phocoena*)		497	505
8	Borkum-Riffgrund SCI[2,3,4]	DE2104301	Harbour porpoise (*Phocoena phocoena*)		527	533
9	Östliche Deutsche Bucht SCI[,4]	DE1011401	Harbour porpoise (*Phocoena phocoena*)		542	551
10	Nationalpark Niedersächsisches Wattenmeer SAC[2,3,4]	DE2306301	Harbour porpoise (*Phocoena phocoena*)		568	577
11	NTP S-H Wattenmeer und angrenzende Küstengebiete SAC[2,3,4]	DE0916391	Harbour porpoise (*Phocoena phocoena*)		598	605
12	Helgoland mit Helgoländer Felssockel SAC[2,3]	DE1813391	Harbour porpoise (*Phocoena phocoena*)		615	625
13	Steingrund SAC[2,3]	DE1714391	Harbour porpoise (*Phocoena phocoena*)		625	631
14	Hamburgisches Wattenmeer SAC[2,3,4]	DE2016301	Harbour porpoise (*Phocoena phocoena*)		656	666
15	Unterweser SCI[2,3,4]	DE2316331	Harbour porpoise (*Phocoena phocoena*)		678	684
16	Unterelbe SCI[2,3,4]	DE2018331	Harbour porpoise (*Phocoena phocoena*)		685	693
Denmark						
17	Sydlige Nordsø SAC[2,3]	DK00VA347	Harbour porpoise (*Phocoena phocoena*)		510	519
18	Gule Rev SAC[2]	DK00VA259	Harbour porpoise (*Phocoena phocoena*)		573	593
19	Vadehavet med Ribe Å, Tved Å og Varde Å vest for Varde SAC[2,3,4]	DK00AY176	Harbour porpoise (*Phocoena phocoena*)		583	592
20	Store Rev SAC[2]	DK00VA258	Harbour porpoise (*Phocoena phocoena*)		657	666
21	Skagens Gren og Skagerak SAC[2]	DK00FX112	Harbour porpoise (*Phocoena phocoena*)		703	710
Netherlands						
22	Doggersbank SAC[2,3]	NL2008001	Harbour porpoise (*Phocoena phocoena*)		292	301
23	Klaverbank[2,3]	NL2008002	Harbour porpoise (*Phocoena phocoena*)		331	336
Sweden						
24	Kosterfjorden-Väderöfjorden SAC[2,3]	SE0520170	Harbour porpoise (*Phocoena phocoena*)		776	788

* All distances are measured as the marine route to the site (i.e. not the distance as the crow flies).
[1] The Annex I habitats which are also qualifying features of this sites are covered in Table 4.1.
[2] All the qualifying Annex I habitat features of the site have been screened out of further assessment on the basis that they are outside the ZOI for benthic receptors as determined in criterion 3 of section 4.1 and so there will be no receptor-impact pathway.
[3] All the other Annex II marine mammal qualifying features of this site have been screened out of further assessment as they fall outside of the screening range for the species as determined in criterion 2 in section 4.3 and so there will be no receptor-impact pathway.
[4] The Annex II diadromous fish qualifying features of this site have been screened out of further assessment as they fall outside of the screening range for migratory fish as determined in criterion 2 in section 4.2 and so there will be no receptor-impact pathway.



Number	Designated Area Name	Site Code
1	Berwickshire and North Northumberland Coast	UK0017072
2	Isle of May	UK0030172
3	Firth of Tay and Eden Estuary	UK0030311
4	Southern North Sea	UK0030395
5	Moray Firth	UK0019808
6	Doggerbank	DE1003301
7	Sylter Außenriff	DE1209301
8	Borkum-Riffgrund	DE2104301
9	SPA Östliche Deutsche Bucht	DE1011401
10	Nationalpark Niedersächsisches Wattenmeer	DE2306301
11	NTP S-H Wattenmeer und angrenzende Küstengebiete	DE0916391
12	Helgoland mit Helgoländer Felssockel	DE1813391
13	Steingrund	DE1714391
14	Hamburgisches Wattenmeer	DE2016301
15	Unterweser	DE2316331
16	Unterelbe	DE2018331
17	Sydlige Nordsø	DK00VA347
18	Gule Rev	DK00VA259
19	Vadehavet med Ribe Å, Tved Å og Varde Å vest for Varde	DK00AY176
20	Store Rev	DK00VA258
21	Skagens Gren og Skagerak	DK00FX112
22	Doggersbank	NL2008001
23	Klaverbank	NL2008002
24	Kosterfjorden-Väderöfjorden	SE0520170

Figure 4.3: Location of European Sites Designated for Annex II Marine Mammal Species Taken Forward for Determination of LSE

4.4. SITES DESIGNATED FOR MARINE ORNITHOLOGICAL FEATURES

4.4.1. POST-CONSULTATION UPDATES

128. In response to the consultation advice provided by MSS (2020a), NS (2020a) and Natural England (2021), the approach used for the initial screening of SPAs and Ramsar sites in relation to marine ornithology has been revised from that adopted in the earlier HRA Screening report for the initial Berwick Bank Wind Farm Proposal. The main changes are as follows:

- Distinguishing four distinct categories of SPAs (and Ramsar sites) that have potential for connectivity with the Proposed Development, based on the types of qualifying features and the function of the protected site in terms of the resources provided for qualifying features.
- Providing explicit consideration of all breeding seabird colony SPAs within the mean maximum breeding season foraging range plus 1 SD of the Proposed Development, for those SPAs on the east coast of Scotland and in north (including Orkney and Shetland) and northwest Scotland.
- Inclusion of additional breeding seabird colony SPAs in northern England.
- Explicit consideration of connectivity during the non-breeding season (as well as during the breeding season) for the breeding seabird colony SPAs and associated qualifying features.
- Consideration of factors that result in an absence of connectivity with the Proposed Development for particular breeding seabird qualifying features and SPAs for which connectivity would be assumed on the basis of the geographical location alone (e.g. being within the mean maximum breeding season foraging range plus 1 SD of the Proposed Development).

4.4.2. INITIAL IDENTIFICATION OF SITES AND POTENTIAL CONNECTIVITY

Defining the qualifying features and sites: Broad-scale considerations

129. Birds present in offshore waters and potentially affected by the construction, operation and decommissioning of the Proposed Development will be predominantly seabirds (defined for this report as auks, gulls, terns, gannets, skuas, shearwaters, petrels, cormorants and divers). These species have the potential to be present in the vicinity of the Proposed Development during the breeding and non-breeding seasons (including the spring and autumn passage periods). Other bird species that may be affected by the Proposed Development include those which may fly through the area of the Proposed Development during their spring and/or autumn migration (or passage) periods (e.g. waterfowl), and any other species which may use the inter-tidal habitats or the inshore or offshore waters which are potentially affected by the Proposed Development.

130. Based on the above, it is considered that (in relation to marine ornithology) the SPAs (and Ramsar sites) which have the potential to be affected by the Proposed Development are those which:

- Overlap with the location of the Proposed Development, or with the area in which potential effects from the Proposed Development could extend (e.g. displacement effects extending beyond the boundary of the array area).
- Include seabird qualifying features that use the waters in and around the Proposed Development (e.g. for foraging).
- Include qualifying features which may fly through the area of the Proposed Development during migration.

131. The SPAs (and Ramsar sites) which meet these different criteria are outlined below under the categories of:

- Marine SPAs.

- Breeding seabird colony SPAs (and Ramsar sites).
- SPAs (and Ramsar sites) with migratory waterbird qualifying features (subsequently termed migratory waterbird SPAs for convenience, with waterbirds defined for this report as waders, ducks, geese, swans, grebes, divers, gulls, terns and cormorants).
- Other SPAs (and Ramsar sites) which are located within the ZOI of the Proposed Development.

Marine SPAs

132. The Outer Firth of Forth and St Andrews Bay Complex SPA abuts the southwest boundary of the array area, whilst the offshore export cable corridor runs through the southern part of this SPA (Figure 4.4). Consequently, all qualifying features of this SPA (as detailed in Table 4.5, subject to the various exclusions outlined in the text below) are considered for determination of LSE in section 5.5.

133. No other marine SPAs are considered to occur within sufficient proximity of the Proposed Development for connectivity to be likely, with next closest such site being the Northumberland Marine SPA which, at approximately 30 km from the Proposed Development, is beyond the distance at which potential effects are likely to extend. This is particularly so, given that such SPAs provide supporting habitat for qualifying features (for purposes such as foraging and moulting), as opposed to providing only the nesting or roosting areas, from which qualifying features commute to their foraging areas.

Breeding seabird SPAs

134. Seabird species may have large foraging ranges during the breeding season (Table 4.4, Woodward *et al.,* 2019). Therefore, the Proposed Development could potentially have effects on seabird qualifying features from a large number of SPA breeding colonies because the area within which it is located may be used by these qualifying features when foraging or when commuting between the colony and foraging areas. Furthermore, seabird qualifying features from SPA breeding colonies may use, or fly through, the area occupied by the Proposed Development during the non-breeding season, when these populations are widely distributed and not constrained by the need to return to the colony.

135. To determine the breeding seabird colony SPAs which may have connectivity with the Proposed Development, those SPAs on the east coast of Scotland and in north (including Orkney and Shetland) and northwest Scotland were considered (Figure 4.4). In addition, several SPAs on the east coast of England were also included for consideration, as advised by Natural England (2021). St Kilda was the most southerly SPA in northwest Scotland included, on the basis that the qualifying features from more southerly sites on the west coast are highly unlikely to use the waters in proximity of the Proposed Development, either during the breeding or non-breeding seasons (Woodward *et al*., 2019; Furness, 2015; Dean *et al*., 2012, 2015; Shoji *et al*., 2015).

Table 4.4: Mean maximum Foraging Ranges of Breeding Seabirds (from Woodward *et al.,* 2019)

Species	Mean maximum foraging range (km) ± 1 SD
Red-throated diver *Gavia stellata*	9.0*
Leach's storm-petrel *Oceanodroma leucorhoa*	657.0**
European storm-petrel *Hydrobates pelagicus*	336.0*
Northern fulmar *Fulmarus glacialis*	542.3 ± 657.9
Manx shearwater *Puffinus puffinus*	1346.0 ± 1018.7
Northern gannet *Morus bassanus*	315.2 ± 194.2
European shag *Phalacrocorax aristotelis*	13.2 ± 10.5
Cormorant *Phalacrocorax carbo*	25.6 ± 8.3
Black-legged kittiwake *Rissa tridactyla*	156.1 ± 144.5
Black-headed gull *Chroicocephalus ridibundus*	18.5*
Common gull *Larus canus*	50.0*
Great black-backed gull *Larus marinus*	73.0*
Herring gull *Larus argentatus*	58.8 ± 26.8
Lesser black-backed gull *Larus fuscus*	127.0 ± 109
Sandwich tern *Thalasseus sandvicensis*	34.3 ± 23.2
Little tern *Sternula albifrons*	5.0*
Arctic tern *Sterna paradisaea*	25.7 ± 14.8
Common tern *Sterna hirundo*	17.6 ± 9.1
Roseate tern *Sterna dougallii*	12.6 ± 10.6
Great skua *Stercorarius skua*	443.3 ± 487.9
Arctic skua *Stercorarius parasiticus*	2 ± 0.7***
Razorbill *Alca torda*	88.7 ± 75.9
Common guillemot *Uria aalge*	73.2 ± 80.5
Black guillemot *Cepphus grylle*	4.8 ± 4.3
Atlantic puffin *Fratercula arctica*	137.1 ± 128.3

Notes:

*No SD available for mean maximum value.

**Mean value without SD – no mean maximum value available.

***Mean value with SD – no mean maximum value available.

Connectivity in the breeding season

136. The initial stage in establishing potential connectivity during the breeding season involved determining whether either the array area or offshore export cable corridor are within (i) the mean maximum foraging range and (ii) the mean maximum foraging range plus 1 SD of each qualifying feature from each of the SPAs (Table 4.4, Woodward *et al*., 2019). For 32 of the 33 SPAs, both the array area and offshore export cable corridor are within the mean maximum foraging range plus 1 SD of at least one qualifying feature, whilst this is the case for 31 SPAs when considering the mean maximum foraging range. For Marwick Head SPA neither the array area nor the offshore export cable corridor are within the mean maximum foraging range plus 1 SD of any qualifying features, whilst this is also the case for Ronas Hill – North Roe and Tingon SPA when considering the mean maximum foraging ranges.

137. However, the measured distances in Table 4.5 represent the shortest straight-line between the SPAs and the Proposed Development and do not incorporate the additional distance involved in flying around (as

opposed to over) larger land masses. Taking this into account increases the effective seabird flight distance for several SPAs, particularly for those in northwest Scotland, and means that there is no potential for breeding season connectivity with Priest Island SPA (because the effective flight distance greatly exceeds the estimated foraging range of storm petrel, which is the single qualifying feature at this SPA – Figure 4.4, Woodward *et al*., 2019). Similarly, consideration of the effective flight distance also excludes the potential for connectivity with kittiwake from Cape Wrath SPA and Handa SPA, and with gannet from St Kilda (on the basis that the effective flight distances between each of these SPAs and the Proposed Development will exceed the mean maximum foraging range plus 1 SD of the relevant qualifying feature – Figure 4.4, Woodward *et al*., 2019). Also, it is considered highly unlikely that Manx shearwater from the St Kilda SPA would have connectivity with Proposed Development, given the foraging areas used by birds from other colonies of this species in western Britain and its known distribution in UK waters (Kober *et al*., 2010; Dean *et al*., 2012, 2015; Shoji *et al*., 2015).

138. Two years of aerial survey data were collected between March 2019 and April 2021 from the array area of the Berwick Bank Wind Farm (as defined in the current report) and a surrounding (approximate) 16 km buffer (as will be outlined in the Baseline Report, which is due to be completed in October 2021). These data demonstrate that several of the species which are identified as having potential breeding season connectivity with the Proposed Development in Table 4.5 occur infrequently and in low numbers within this survey area during the breeding season. Thus, there were no breeding season records of Roseate tern, cormorant or Leach's storm petrel, whilst there was a maximum of three shag, nine Sandwich tern, eight great skua and six storm petrel recorded in any single breeding season period. Based on this low level of occurrence, there is considered to be little, or no, potential for breeding season connectivity for SPA populations of these species, except in the context of these species as qualifying features of the Outer Firth of Forth and St Andrews Bay Complex SPA or of migratory waterbird SPAs.

139. Given the above, it is considered that 28 of the breeding seabird colony SPAs identified in Table 4.5 have potential connectivity with the Proposed Development during the breeding season. In addition to the exclusion of Marwick Head SPA and Priest Island SPA (see above), it is also considered that there is no potential for connectivity with:

- Ramna Stacks and Gruney SPA due to the absence of records of Leach's storm petrel (the only qualifying feature of this SPA) during the baseline surveys for the Proposed Development.
- Ronas Hill – North Roe and Tingon SPA due to the scarcity of breeding season records of great skua during the baseline surveys for the Proposed Development (great skua being the only qualifying feature of this SPA within mean maximum foraging range plus 1 SD of the Proposed Development).
- Auskerry SPA due to the scarcity of breeding season records of storm petrel during the baseline surveys for the Proposed Development (storm petrel being the only qualifying feature of this SPA within likely foraging range of the Proposed Development).

Table 4.5: European Sites Designated for Marine Ornithological Features with Potential Connectivity to the Proposed Development

ID	European Site	Site Code	Distance to Berwick Bank Proposed Development Array Area (km)[1]	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)[1]	Relevant Qualifying Features[2]	Breeding seabird colony sites	
						Within mean maximum foraging range[3, 4]	Within mean maximum foraging range +1SD[3,4]
Marine SPAs							
1	Outer Firth of Forth and St Andrew's Bay Complex SPA	UK9020316	0.0	0.0	• Arctic tern *Sterna paradisaea* (breeding) • common tern *Sterna hirundo* (breeding) • little gull *Hydrocoloeus minutus* (non-breeding) • red-throated diver *Gavia stellata* (non-breeding) • Slavonian grebe *Podiceps auritus* (non-breeding) • gannet *Morus bassanus* (breeding) • shag *Phalacrocorax aristotelis* (breeding) • eider *Somateria mollissima* (non-breeding) • seabird assemblage (breeding) including the components: – puffin *Fratercula arctica* – kittiwake *Rissa tridactyla* – Manx shearwater *Puffinus puffinus* – guillemot *Uria aalge* – herring gull *Larus argentatus* • seabird assemblage (non-breeding) including the components: – black-headed gull *Chroicocephalus ridibundus* – common gull *Larus canus* – herring gull – guillemot – shag – kittiwake – razorbill *Alca torda* • Waterfowl assemblage (non-breeding) including the components: – long-tailed duck *Clangula hyemalis* – common scoter *Melanitta nigra* – velvet scoter *Melanitta fusca* – goldeneye *Bucephala clangula* – red-breasted merganser *Mergus serrator*	N/A	N/A
Breeding seabird colonies							
2	St Abb's Head to Fast Castle SPA	UK9004271	32.2	3.7	• seabird assemblage (breeding) including the components: – guillemot – razorbill – herring gull – kittiwake – shag	 Y Y Y Y N/Y	 Y Y Y Y N/Y
3	Forth Islands SPA	UK9004171	35.6	13.7	• Arctic tern (breeding) • common tern (breeding) • Roseate tern *Sterna dougallii* (breeding)	N/Y N/Y N	Y N/Y N/Y

ID	European Site	Site Code	Distance to Berwick Bank Proposed Development Array Area (km)[1]	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)[1]	Relevant Qualifying Features[2]	Breeding seabird colony sites	
						Within mean maximum foraging range[3, 4]	Within mean maximum foraging range +1SD[3,4]
					• Sandwich tern *Sterna sandvicensis* (breeding)	N/Y	Y
					• gannet (breeding)	Y	Y
					• shag (breeding)	N	N/Y
					• lesser black-backed gull (breeding)	Y	Y
					• puffin (breeding)	Y	Y
					• seabird assemblage (breeding) including the components:		
					– guillemot	Y	Y
					– razorbill	Y	Y
					– kittiwake	Y	Y
					– herring gull	Y	Y
					– cormorant *Phalacrocorax carbo*	N/Y	N/Y
4	Fowlsheugh SPA	UK9002271	47.2	87.8	• seabird assemblage (breeding) including the components:		
					– fulmar *Fulmarus glacialis*	Y	Y
					– guillemot	Y/N	Y
					– herring gull	Y/N	Y/N
					– kittiwake	Y	Y
					– razorbill	Y	Y
5	Farne Islands SPA	UK9006021	51.8	50.5	• Arctic tern (breeding)	N	N
					• common tern (breeding)	N	N
					• Roseate tern (breeding)	N	N
					• guillemot (breeding)	Y	Y
					• seabird assemblage (breeding) including the components:		
					– kittiwake	Y	Y
					– shag	N	N
					– cormorant	N	N
					– puffin	Y	Y
6	Coquet Island SPA	UK9006031	85.2	83.2	• Arctic tern (breeding)	N	N
					• common tern (breeding)	N	N
					• Roseate tern (breeding)	N	N
					• Sandwich tern (breeding)	N	N
					• seabird assemblage (breeding) including the components:		
					– puffin	Y	Y
					– black-headed gull	N	N
					– fulmar	Y	Y
					– herring gull	N	Y
					– lesser black-backed gull	Y	Y
					– kittiwake	Y	Y
7	Buchan Ness to Collieston Coast SPA	UK9002491	93.6	132.0	• seabird assemblage (breeding) including the components:		
					– kittiwake	Y	Y
					– herring gull	N	N
					– guillemot	N	Y

ID	European Site	Site Code	Distance to Berwick Bank Proposed Development Array Area (km)[1]	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)[1]	Relevant Qualifying Features[2]	Breeding seabird colony sites	
						Within mean maximum foraging range[3, 4]	Within mean maximum foraging range +1SD[3,4]
					– shag – fulmar	N Y	N Y
8	Troup, Pennan and Lion's Heads SPA	UK9002471	133.4	173.3	• kittiwake (breeding) • guillemot (breeding) • seabird assemblage (breeding) including the components: – fulmar – herring gull – razorbill	Y/N N Y N N	Y Y/N Y N Y/N
9	East Caithness Cliffs SPA	UK9001182	206.0	243.1	• guillemot (breeding) • razorbill (breeding) • herring gull (breeding) • kittiwake (breeding) • shag (breeding) • seabird assemblage (breeding) including the components: – great black-backed gull *Larus marinus* – cormorant – fulmar	N N N N N N N Y	N N N Y N N N Y
10	Flamborough and Filey Coast SPA	UK9006101	214.4	219.9	• gannet (breeding) • kittiwake (breeding) • guillemot (breeding) • razorbill (breeding) • seabird assemblage (breeding) including the components: – fulmar – puffin – herring gull – shag – cormorant	Y N N N Y N N N N	Y Y N N Y Y N N N
11	North Caithness Cliffs SPA	UK9001181	241.4	281.4	• guillemot (breeding) • seabird assemblage (breeding)) including the components: – fulmar – kittiwake – razorbill – puffin	N Y N N N	N Y Y N Y/N
12	Hoy SPA	UK9002141	264.7	304.4	• red-throated diver (breeding) • great skua *Stercorarius skua* (breeding) • seabird assemblage (breeding) including the components: – puffin – kittiwake – Arctic skua *Stercorarius parasiticus* – fulmar	N Y N N N Y N	N Y Y/N Y/N N Y N

ID	European Site	Site Code	Distance to Berwick Bank Proposed Development Array Area (km)[1]	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)[1]	Relevant Qualifying Features[2]	Breeding seabird colony sites	
						Within mean maximum foraging range[3, 4]	Within mean maximum foraging range +1SD[3,4]
					– great black-backed gull – guillemot	N	N
13	Priest Island SPA	UK9001261	268.3	287.6	• storm petrel *Hydrobates pelagicus* (breeding)	Y	Y
14	Copinsay SPA	UK9002151	269.3	309.5	• seabird assemblage (breeding) including the components: – guillemot – kittiwake – great black-backed gull – fulmar	 N N N Y	 N Y/N N Y
15	Handa SPA	UK9001241	282.3	309.9	• guillemot • razorbill • seabird assemblage (breeding) including the components: – great skua – kittiwake – fulmar	N N Y N Y	N N Y Y/N Y
16	Auskerry SPA	UK9002381	285.5	325.3	• storm petrel (breeding) • Arctic tern (breeding)	Y N	Y N
17	Cape Wrath SPA	UK9001231	288.2	321.0	• seabird assemblage (breeding) including the components: – kittiwake – guillemot – razorbill – puffin – fulmar	 N N N N Y	 Y/N N N N Y
18	Marwick Head SPA	UK9002121	301.8	341.7	• guillemot (breeding) • seabird assemblage (breeding) including the components: – kittiwake	N N	N N
19	Shiant Isles SPA	UK9001041	302.2	314.4	• shag (breeding) • razorbill (breeding) • puffin (breeding) • seabird assemblage (breeding) including the components: – fulmar – guillemot – kittiwake	N N N Y N N	N N N Y N N
20	Rousay SPA	UK9002371	303.4	343.7	• Arctic tern (breeding) • seabird assemblage (breeding) including the components: – Arctic skua – kittiwake – guillemot – fulmar	N N N N Y	N N N N Y
21	Calf of Eday SPA	UK9002431	307.1	347.1	• seabird assemblage (breeding) including the components: – cormorant	 N	 N

ID	European Site	Site Code	Distance to Berwick Bank Proposed Development Array Area (km)[1]	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)[1]	Relevant Qualifying Features[2]	Breeding seabird colony sites	
						Within mean maximum foraging range[3, 4]	Within mean maximum foraging range +1SD[3,4]
					– great black-backed gull	N	N
					– guillemot	N	N
					– fulmar	Y	Y
					– kittiwake	N	N
22	West Westray SPA	UK9002101	314.9	355.4	• Arctic tern (breeding)	N	N
					• guillemot (breeding)	N	N
					• seabird assemblage (breeding) including the components:		
					– razorbill	N	N
					– kittiwake	N	N
					– Arctic skua	N	N
					– fulmar	Y	Y
23	Sule Skerry and Sule Stack SPA	UK9002181	317.7	358.2	• Storm petrel (breeding)	Y/N	Y/N
					• Leach's storm petrel (breeding)	Y	Y
					• gannet (breeding)	N	Y
					• puffin (breeding)	N	N
					• seabird assemblage (breeding) including the components:		
					– guillemot	N	N
					– shag	N	N
24	Fair Isle SPA	UK9002091	334.0	371.7	• Arctic tern (breeding)	N	N
					• guillemot (breeding)	N	N
					• seabird assemblage (breeding) including the components:		
					– puffin	N	N
					– razorbill	N	N
					– kittiwake	N	N
					– great skua	Y	Y
					– Arctic skua	N	N
					– shag	N	N
					– gannet	N	Y
					– fulmar	Y	Y
25	North Rona and Sula Sgeir SPA	UK9001011	368.1	398.8	• gannet (breeding)	N	Y
					• fulmar (breeding)	Y	Y
					• seabird assemblage (breeding) including the components:		
					– great black-backed gull	N	N
					– kittiwake	N	N
					– razorbill	N	N
					– puffin	N	N
26	Sumburgh Head SPA	UK9002511	372.4	410.11	• Arctic tern (breeding)	N	N
					• seabird assemblage (breeding) including the components:		
					– guillemot	N	N
					– kittiwake	N	N
					– fulmar	Y	Y

ID	European Site	Site Code	Distance to Berwick Bank Proposed Development Array Area (km)[1]	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)[1]	Relevant Qualifying Features[2]	Breeding seabird colony sites	
						Within mean maximum foraging range[3, 4]	Within mean maximum foraging range +1SD[3,4]
27	Flannan Isles SPA	UK9001021	387.2	398.8	• Leach's storm petrel (breeding) • seabird assemblage (breeding) including the components: – guillemot – razorbill – puffin – fulmar – kittiwake	Y N N N Y N	Y N N N Y N
28	Foula SPA	UK9002061	401.9	439.5	• Arctic tern (breeding) • Leach's storm petrel (breeding) • red-throated diver (breeding) • great skua (breeding) • guillemot (breeding) • puffin (breeding) • shag (breeding) • seabird assemblage (breeding) including the components: – kittiwake – razorbill – Arctic skua – fulmar	N Y N Y N N N N N N Y	N Y N Y N N N N N N Y
29	Noss SPA	UK9002081	404.1	441.7	• gannet (breeding) • great skua (breeding) • guillemot (breeding) • seabird assemblage (breeding) including the components: – fulmar – kittiwake – puffin	N Y N Y N N	Y Y N Y N N
30	St Kilda SPA	UK9001031	415.3	415.6	• Storm petrel (breeding) • Leach's storm petrel (breeding) • gannet (breeding) • great skua (breeding) • puffin (breeding) • seabird assemblage (breeding) including the components: – guillemot – razorbill – kittiwake – Manx shearwater – fulmar	N Y N Y N N N N Y Y	N Y Y Y N N N N Y Y
31	Ronas Hill – North Roe and Tingon SPA	UK9002041	447.6	485.4	• red-throated diver (breeding) • great skua (breeding) • seabird assemblage (breeding) including the components:	N N	N Y

ID	European Site	Site Code	Distance to Berwick Bank Proposed Development Array Area (km)[1]	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)[1]	Relevant Qualifying Features[2]	Breeding seabird colony sites	
						Within mean maximum foraging range[3, 4]	Within mean maximum foraging range +1SD[3,4]
					– Arctic skua – black guillemot	N N	N N
32	Fetlar SPA	UK9002031	452.3	489.8	• Arctic tern (breeding) • great skua (breeding) • seabird assemblage (breeding) including the components: – Arctic skua – fulmar	N N N Y	N Y N Y
33	Ramna Stacks and Gruney SPA	UK9002021	463.5	501.2	• Leach's storm petrel (breeding)	Y	Y
34	Hermaness, Saxa Vord and Valla Field SPA	UK9002011	471.9	509.4	• red-throated diver (breeding) • gannet *Morus bassanus* (breeding) • great skua (breeding) • puffin (breeding) • seabird assemblage (breeding) including the components: – fulmar – shag – guillemot – kittiwake	N N N N Y N N N	N Y Y N Y N N N
Migratory waterbird sites (estuarine)							
35	Firth of Forth SPA and Ramsar site	UK9004411 UK13017	36.6	5.9	• bar-tailed godwit *Limosa lapponica* (non-breeding) • golden plover *Pluvialis apricaria* (non-breeding) • knot *Calidris canutus* (non-breeding) • pink-footed goose *Anser brachyrhynchus* (non-breeding) • red-throated diver (non-breeding) • redshank *Tringa totanus* (non-breeding) • Sandwich tern (passage) • shelduck *Tadorna tadorna* (non-breeding) • Slavonian grebe (non-breeding) • turnstone *Arenaria interpres* (non-breeding) • waterfowl assemblage (non-breeding) including the components: – scaup *Aythya marila* – great crested grebe *Podiceps cristatus* – cormorant – curlew *Numenius arquata* – eider – long-tailed duck – common scoter – velvet scoter – goldeneye – red-breasted merganser – oystercatcher *Haematopus ostralegus*	N/A	N/A

ID	European Site	Site Code	Distance to Berwick Bank Proposed Development Array Area (km)[1]	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)[1]	Relevant Qualifying Features[2]	Breeding seabird colony sites	
						Within mean maximum foraging range[3, 4]	Within mean maximum foraging range +1SD[3,4]
					– ringed plover *Charadrius hiaticula* – grey plover *Pluvialis squatarola* – dunlin *Calidris alpina alpina* – mallard *Anas platyrhynchos* – lapwing *Vanellus vanellus* – wigeon *Anas penelope*		
36	Montrose Basin SPA and Ramsar site	UK9004031 UK13046	38.9	72.2	• greylag goose *Anser anser* (non-breeding) • pink-footed goose (non-breeding) • redshank (non-breeding) • waterfowl assemblage (non-breeding) including the components: – oystercatcher – eider – wigeon – knot – dunlin – shelduck	N/A	N/A
37	Northumbria Coast SPA and Ramsar site	UK9006131 UK11048	43.1	30.0	• purple sandpiper *Calidris maritima* (non-breeding) • turnstone (non-breeding)	N/A	N/A
38	Firth of Tay and Eden Estuary SPA and Ramsar site	UK9004121 UK13018	43.2	45.3	• bar-tailed godwit (non-breeding) • greylag goose (non-breeding) • pink-footed goose (non-breeding) • redshank (non-breeding) • waterfowl assemblage (non-breeding) including the components: – velvet scoter – cormorant – shelduck – eider – common scoter *Melanitta nigra* – Icelandic black-tailed godwit *Limosa limosa islandica* – goldeneye – red-breasted merganser – goosander *Mergus merganser* – oystercatcher – grey plover – sanderling *Calidris alba* – dunlin – long-tailed duck	N/A	N/A
39	Lindisfarne SPA and Ramsar site	UK9006011 UK11036	44.6	32.6	• bar-tailed godwit (non-breeding) • common scoter (non-breeding) • dunlin (non-breeding)	N/A	N/A

ID	European Site	Site Code	Distance to Berwick Bank Proposed Development Array Area (km)[1]	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)[1]	Relevant Qualifying Features[2]	Breeding seabird colony sites	
						Within mean maximum foraging range[3, 4]	Within mean maximum foraging range +1SD[3,4]
					• eider (non-breeding) • golden plover (non-breeding) • grey plover (non-breeding) • greylag goose (non-breeding) • light-bellied brent goose *Branta bernicla hrota* (non-breeding) • long-tailed duck (non-breeding) • red-breasted merganser (non-breeding) • redshank (non-breeding) • ringed plover (non-breeding) • sanderling (non-breeding) • shelduck (non-breeding) • whooper swan *Cygnus cygnus* (non-breeding) • wigeon (non-breeding) • waterbird assemblage (non-breeding)		
40	Ythan Estuary, Sands of Forvie and Meikle Loch SPA, Ythan Estuary and Meikle Loch Ramsar site	UK9002221 UK13061	74.5	114.8	• pink-footed goose (non-breeding) • waterfowl assemblage (non-breeding) including the components: – eider – lapwing – redshank	N/A	N/A
Migratory waterbird sites (inland waterbodies)							
41	Cameron Reservoir SPA and Ramsar site	UK9004131 UK13005	51.9	42.0	• pink-footed goose (non-breeding)	N/A	N/A
42	Holburn Lake and Moss SPA and Ramsar site	UK9006041 UK11030	55.9	44.4	• greylag goose (non-breeding)	N/A	N/A
43	Greenlaw Moor SPA and Ramsar site	UK9004281 UK13022	60.6	23.4	• pink-footed goose (non-breeding)	N/A	N/A
44	Loch of Kinnordy SPA and Ramsar site	UK9004051 UK13038	67.7	84.1	• greylag goose (non-breeding) • pink-footed goose (non-breeding)	N/A	N/A
45	Din Moss - Hoselaw Loch SPA and Ramsar site	UK9004291 UK13010	69.1	40.8	• greylag goose (non-breeding) • pink-footed goose (non-breeding)	N/A	N/A
46	Fala Flow SPA and Ramsar site	UK9004241 UK13015	77.7	33.4	• pink-footed goose (non-breeding)	N/A	N/A
47	Loch Leven SPA and Ramsar site	UK9004111 UK13033	83.8	59.8	• whooper swan (non-breeding) • pink-footed goose (non-breeding) • shoveler *Anas clypeata* (non-breeding) • waterfowl assemblage (non-breeding) including the components:	N/A	N/A

ID	European Site	Site Code	Distance to Berwick Bank Proposed Development Array Area (km)[1]	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)[1]	Relevant Qualifying Features[2]	Breeding seabird colony sites	
						Within mean maximum foraging range[3, 4]	Within mean maximum foraging range +1SD[3,4]
					– cormorant – gadwall *Anas strepera* – teal *Anas crecca* – pochard *Aythya ferina* – tufted duck *Aythya fuligula* – goldeneye		
48	Gladhouse Reservoir SPA and Ramsar site	UK9004231 UK13021	91.6	47.2	• pink-footed goose (non-breeding)	N/A	N/A
49	South Tayside Goose Roosts SPA and Ramsar site	UK9004401 UK13057	95.4	81.8	• greylag goose (non-breeding) • pink-footed goose (non-breeding) • wigeon (non-breeding) • waterfowl assemblage (non-breeding)	N/A	N/A
50	Westwater SPA and Ramsar site	UK9004251 UK13060	109.3	65.3	• pink-footed goose (non-breeding) • waterfowl assemblage (non-breeding)	N/A	N/A
51	Slamannan Plateau SPA	UK9004441	123.0	88.9	• taiga bean goose *Anser fabalis fabalis* (non-breeding)	N/A	N/A

Notes:

1. Measured as the closest, straight line, distance from the SPA (irrespective of the presence of land masses).

2. This includes all qualifying features of the marine SPA, all seabird qualifying features of the breeding seabird colony SPAs and all passage and wintering waterbird qualifying features of the migratory waterbird SPAs (and Ramsar sites). The definitions of seabirds and waterbirds used in this report are given in the text. A small number of SPAs in the breeding seabird category (all in Orkney or Shetland) include breeding raptor or wader qualifying features, whilst a small number in the migratory waterbird category include breeding tern or (in one case) raptor qualifying features. These are not considered relevant to this assessment (noting that the breeding tern qualifying features from the migratory waterbird SPAs are beyond the mean maximum foraging range plus 1 SD from the Proposed Development).

3. Relevant to qualifying features of breeding seabird colony SPAs only (and not applicable (N/A) to the qualifying features of other SPAs). Breeding seabird foraging ranges are from Woodward *et al.*, (2019). Where a qualifying feature is within foraging range of the array area but not the offshore export cable corridor this is indicated by Y/N (with N/Y indicating the opposite situation).

4. For a small number of species no estimate of the mean maximum foraging range is available, with the mean or maximum foraging range being used instead (see Table 4.4 and Woodward *et al.*, 2019 for details).

Connectivity in the non-breeding season

140. Outside the breeding season seabirds are not constrained by the requirement to attend nests and may disperse over greater distances than during the breeding season. As such, there is potential for connectivity with a greater range of qualifying features from breeding seabird colony SPAs than during the breeding season. MSS (2020b) and NS (2020c) advise that consideration of the potential for non-breeding season effects associated with the Proposed Development should be based upon the BDMPS approach (Furness, 2015) for all species other than guillemot. For guillemot, it is advised that the breeding season foraging range should be used because this species is not considered to disperse as widely from the breeding areas as are other seabird species during the non-breeding season.

141. For most seabird species there are only two BDMPS regions defined within UK waters (with the main division being between the North Sea and western waters), although there are up to five for some species (Furness 2015). For almost all species, the BDMPS of relevance to the Proposed Development is defined as the UK North Sea and Channel or the UK North Sea (although for red-throated diver, shag and cormorant it is the North West North Sea and for Roseate tern the East Coast and Channel). Within these large expanses of offshore waters, it is generally assumed that there is even mixing of birds from the different 'source' populations (from the UK and elsewhere) during passage and other non-breeding periods (Furness, 2015).

142. During the two years of aerial surveys undertaken between March 2019 and April 2021 across the array area and buffer, no records of Roseate tern, little tern, storm petrel, Leach's storm petrel or cormorant were obtained during the respective passage periods or non-breeding seasons1 for these species. Also, several other species were recorded in very low numbers during the passage periods or non-breeding seasons. Thus, there was a single non-breeding season record of shag and a maximum of four records of lesser black-backed gull during any single non-breeding season, whilst a maximum of four Arctic skua and one Sandwich tern were recorded during any passage period. On the basis of these low levels of occurrence within the array area and surrounding survey buffer, it is considered that connectivity with any SPA populations of these species during the non-breeding season is highly unlikely (except in the context of these species as qualifying features of the Outer Firth of Forth and St Andrews Bay Complex SPA or of migratory waterbird SPAs – Table 4.5).

143. For several other seabird species, connectivity between SPA populations and the Proposed Development during the non-breeding season can be excluded on the basis of the small (or negligible) contribution of these populations to the overall BDMPS population. Thus, none of the UK Manx shearwater SPA populations are considered to contribute to the UK North Sea BDMPS for this species, whilst for red-throated diver, great black-backed gull, common tern and Arctic tern, 85% to 95% of the relevant BDMPS population of adult birds are estimated to derive from non-UK populations combined with non-SPA UK colonies (Furness 2015). For these latter species, the maximum contribution of any individual SPA population to the BDMPS population of adult birds is 5% for red-throated diver (Ronas Hill – North Roe and Tingon SPA), 3.3% for Arctic tern (Farne Islands SPA), 1.75% for great black-backed gull (Calf of Eday SPA) and 1.6% for common tern (Coquet Island SPA). Given the large size of most of these BDMPS populations , together with the assumption of even mixing of birds from different populations (and age classes) across the BDMPS, only a very small number of SPA birds would be estimated to occur within the vicinity of the Proposed Development.

144. The above considerations indicate that the potential for connectivity between breeding seabird colony SPAs and the Proposed Development during the non-breeding season can be excluded in relation to several of the seabird species which are qualifying features of these SPAs. The remaining species of relevance are fulmar, herring gull, kittiwake, great skua, gannet, guillemot, razorbill and puffin. These include the species recorded in greatest abundance on the array area and the associated buffer during the baseline aerial surveys. For guillemot, connectivity during the non-breeding season is determined on the same basis as for the breeding season (following the advice of MSS and NS – see above). For the other species, it is assumed that there is the potential for non-breeding season effects (and hence connectivity) for any of the SPA populations for which breeding season connectivity is established (as determined from the species' mean maximum foraging range plus 1 SD - see Table 4.5 and associated text above). The potential for connectivity with other SPA populations of these species during the non-breeding season is determined on the basis of the contribution of these SPA populations to the relevant BDMPS population (Table 4.6).

Table 4.6: The Percentage Contribution of Different SPA Populations to the BDMPS Population Relevant to the Proposed Development (Based on Adult Birds only), as Derived from Furness (2015). SPA Populations are Included for those Species with Potential Connectivity to the Proposed Development During the Non-Breeding Season but for which the SPA Population does not have Breeding Season Connectivity (See Text). For Species with Multiple Non-Breeding Periods (E.G. Spring And Autumn Passage), the Maximum Percentage Contribution to the BDMPS Population is Presented.

SPA	Percentage contribution to the BDMPS population (%)[1]						
	Fulmar	Herring gull	Kittiwake	Great skua	Gannet	Puffin	Razorbill
Troup, Pennan and Lion's Heads SPA	-	1.50	-	N/A	N/A	N/A	1.15
East Caithness Cliffs SPA	-	3.19	-	N/A	N/A	N/A	8.27
Flamborough and Filey Coast SPA	-	0.47	-	N/A	-	-	6.62
North Caithness Cliffs SPA	-	N/A	-	N/A	N/A	-	1.07
Hoy SPA	-	N/A	-	14.1	N/A	-	N/A
Handa SPA	-	N/A	0.01	0.00	N/A	N/A	0.97
Cape Wrath SPA	-	N/A	0.05	N/A	N/A	0.00	0.39
Marwick Head SPA	N/A	N/A	0.17	N/A	N/A	N/A	N/A
Shiant Isles SPA	-	N/A	0.00	N/A	N/A	0.07	0.08
Rousay SPA	-	N/A	0.56	N/A	N/A	N/A	N/A
Calf of Eday SPA	-	N/A	0.24	N/A	N/A	N/A	N/A
West Westray SPA	-	N/A	3.85	N/A	N/A	N/A	0.35
Sule Skerry and Sule Stack SPA	-	N/A	N/A	N/A	-	0.06	N/A
Fair Isle SPA	-	N/A	0.25	2.8	-	1.61	0.57
North Rona and Sula Sgeir SPA	-	N/A	0.01	N/A	-	0.01	0.21
Sumburgh Head SPA	-	N/A	0.07	N/A	N/A	N/A	N/A
Flannan Isles SPA	-	N/A	0.01	N/A	N/A	0.02	0.02
Foula SPA	-	N/A	0.10	17.4	N/A	3.38	0.24

SPA	Percentage contribution to the BDMPS population (%)[1]						
	Fulmar	Herring gull	Kittiwake	Great skua	Gannet	Puffin	Razorbill
Noss SPA	-	N/A	0.16	4.9	-	0.12	N/A
St Kilda SPA	-	N/A	0.01	0.00	4.23	0.14	0.32
Ronas Hill – North Roe and Tingon SPA	N/A	N/A	N/A	2.0	N/A	N/A	N/A
Fetlar SPA	-	N/A	N/A	6.1	N/A	N/A	N/A
Hermaness, Saxa Vord and Valla Field SPA	-	N/A	0.12	10.3	-	3.55	N/A
Canna and Sanday	N/A	0.00	0.00	N/A	N/A	0.00	N/A
Rum	N/A	N/A	0.00	N/A	N/A	N/A	N/A
Mingulay and Berneray	0.09	N/A	0.01	N/A	N/A	0.00	1.90
North Colonsay	N/A	N/A	0.03	N/A	N/A	N/A	N/A
Ailsa Craig	N/A	0.01	0.00	N/A	0.00	N/A	N/A
Rathlin Island	0.01	0.00	0.04	N/A	N/A	0.00	1.45
Morecambe Bay	N/A	0.08	N/A	N/A	N/A	N/A	N/A
Skomer, Skokholm and Seas off Pembrokshire	N/A	N/A	0.01	N/A	N/A	0.02	0.57
Grassholm	N/A	N/A	N/A	N/A	0.00	N/A	N/A
Alde-Ore Estuary	N/A	0.75	N/A	N/A	N/A	N/A	N/A
Numbers of adult birds in BDMPS population[2]	408,808 – 573,641	210,289	375,815 – 480,815	5,718 – 11,436	163,701 – 284,747	199,974	106,183 – 302,314
Numbers of all birds (adults and immatures) in BDMPS population[2]	568,736 - 957,502	466,511	627,816 – 829,937	8,485 - 19,556	248,385 – 534,632	231,957	218,622 – 591,874

Notes:

1. 'N/A' indicates that the species is not a qualifying feature of the SPA. '–' indicates that the SPA population has breeding season connectivity with the Proposed Development (so that non-breeding season connectivity is assumed – see text).

2. A range is given for species with multiple non-breeding periods, encompassing the minimum and maximum BDMPS population size (noting that the winter BDMPS population size for great skua is omitted because it includes no birds from UK colonies).

145. The data in Table 4.6 demonstrate that, with the exception of great skua, these other SPA populations generally comprise a small part of the overall BDMPS population of the species (being substantially below 1% in the vast majority of cases). Therefore, when the large size of the BDMPS populations is considered together with the assumption of even mixing of birds from different populations (and age classes), it is apparent that there is unlikely to be any substantive connectivity between most of these SPA populations and the Proposed Development during the non-breeding season. In two cases the SPA populations comprise more than 5% of the relevant BDMPS population (razorbill from the East Caithness Cliffs SPA (8.3%) and from the Flamborough and Filey Coast SPA (6.6%)) and, on a precautionary basis, it is considered that these two populations will have connectivity with the Proposed Development during the non-breeding season. For great skua, the SPA populations from Hoy, Foula, Fetlar and Hermaness, Saxa Vord and Valla Field each comprise relatively high percentages of the BDMPS population and, as such, it is considered that they will also have connectivity with the Proposed Development during the non-breeding season.

146. Therefore, consideration of connectivity during the non-breeding season does not result in the inclusion of any additional breeding seabird SPAs (over and above the 28 for which connectivity with the Proposed Development during the breeding season has been established).

Migratory waterbird SPAs (and Ramsar sites)

147. To identify European sites designated for migratory waterbirds which have potential connectivity with the Proposed Development, consideration has been given to the likely migratory pathways and distribution of coastal estuarine sites and inland waterbody roost sites for the associated species. The search area for initial screening is therefore focussed on the estuarine and inland waterbody SPAs and Ramsar sites within the Eastern Lowlands and Border Hills Natural Heritage Zones (NHZs) (Figure 4.4). The Slamannan Plateau SPA (in the West Central Belt NHZ) and the Ythan Estuary, Sands of Forvie and Meikle Loch SPA / Ythan Estuary and Meikle Loch Ramsar site (in the North East Coastal Plain NHZ) are also included because of the potential for the waterbird qualifying features from these sites to use migratory pathways within the vicinity of the Proposed Development. Additionally, the Northumbria Coast SPA (and Ramsar site), Lindisfarne SPA (and Ramsar site) and Holburn Lake and Moss SPA (and Ramsar site) are included following advice from Natural England (2021).

148. Therefore, a total of 17 SPAs for migratory waterbirds are considered to have the potential for connectivity with the Proposed Development and are taken forward for determination of LSE (Table 4.5). Within Table 4.5, these SPAs are subdivided according to whether they are estuarine or inland sites.

Other SPAs (and Ramsar sites) within the ZOI

149. The potential ZOI of impacts associated with the Proposed Development (e.g. habitat loss/disturbance, noise and risk of collision) is considered to be limited to the area within 2 km of the Proposed Development array area and offshore export cable corridor for most bird species, which is the area over which displacement effects are potentially considered to occur. This may extend to considerably greater distances for some species, notably red-throated diver which shows particular sensitivity to various sources of anthropogenic disturbance (e.g. Mendel *et al*., 2019, Dorsch *et al*., 2020).

150. Other than the Outer Firth of Forth and St Andrews Bay Complex SPA (considered above under marine SPAs), no SPAs or Ramsar sites occur within 2 km of the Proposed Development. However, the Firth of Forth SPA (and Ramsar site) is located within 5.9 km of the offshore export cable corridor and non-breeding red-throated diver is a qualifying feature of this SPA, suggesting that there may be the potential for disturbance effects on this SPA associated with the offshore export cable corridor. This SPA is already

included for the determination of LSE in relation to effects on migratory waterbirds (Table 4.5). In addition, consideration is also given to determining LSE as a result of the potential for such disturbance effects.

4.4.3. SUMMARY OF INITIAL SCREENING OF SITES FOR MARINE ORNITHOLOGICAL FEATURES

151. As detailed above, the initial screening process identifies 46 European sites with seabirds or migratory waterbirds as qualifying features to be taken forward for detailed determination of LSE in section 5.5 of this report. These sites are identified, together with their distance to the Proposed Development and the qualifying features of relevance, in Table 4.5 noting that the further details outlined in the above text mean that five of the 33 breeding seabird colony SPAs identified in Table 4.5 are excluded from further consideration). The locations of these different sites are shown in Figure 4.4. Table 4.5 identifies the full list of qualifying features for all but six of the 46 SPAs (and Ramsar sites) which are taken forward for determination of LSE. The Natura 2000 standard data forms for the six sites for which some qualifying features are not identified in Table 4.5 are provided in Appendix 1. These six sites are Hoy SPA, Ronas Hill – North Roe and Tingon SPA, Fetlar SPA, the Firth of Forth SPA and Ramsar site, Lindisfarne SPA and Ramsar site and the Ythan Estuary, Sands of Forvie and Meikle Loch SPA / Ythan Estuary and Meikle Loch Ramsar site.

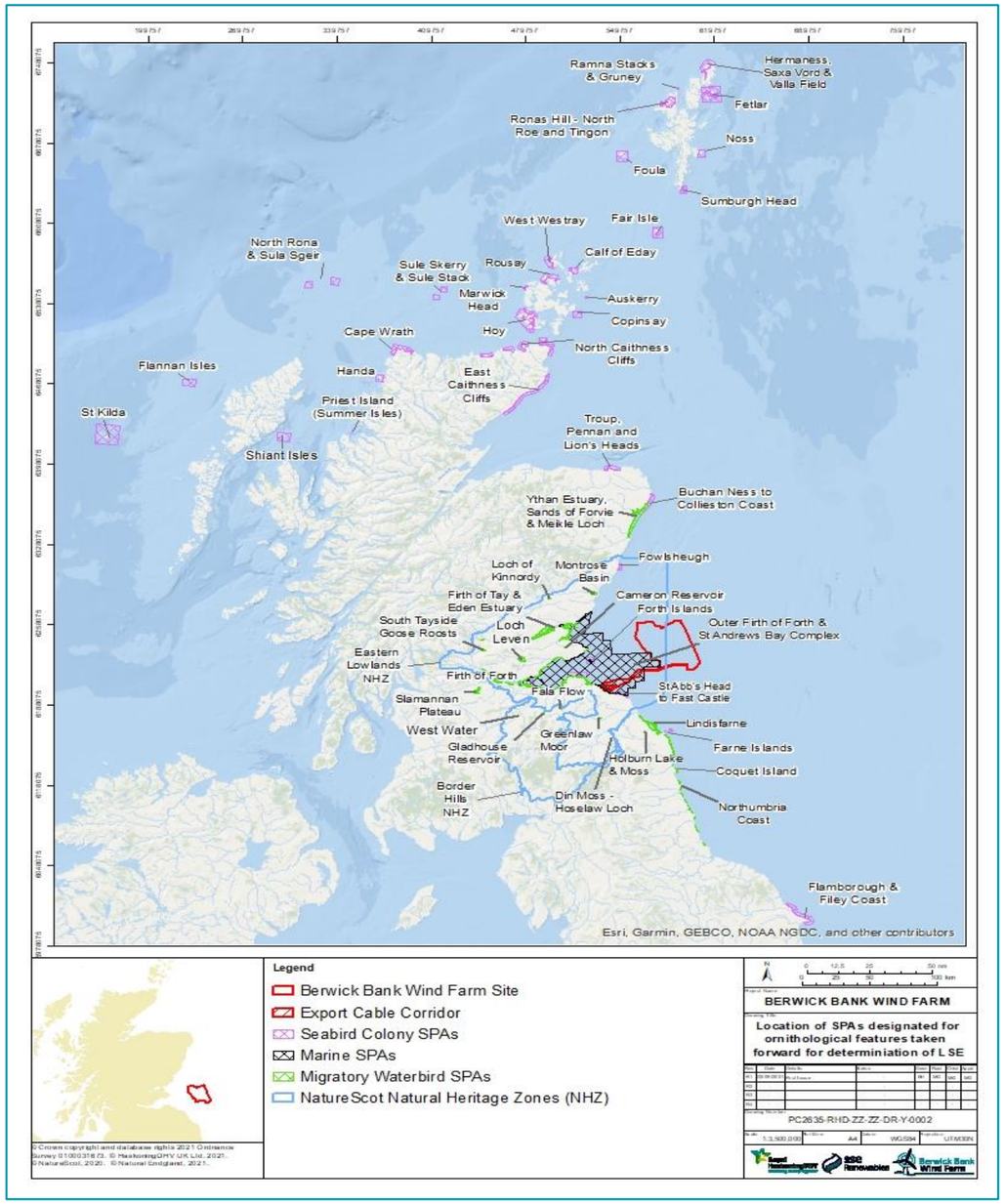


Figure 4.4: Location of European Sites Designated for Ornithological Features (Seabirds and Migratory Waterbirds) Taken Forward for Determination of LSE

5. DETERMINATION OF LIKELY SIGNIFICANT EFFECT

152. The initial screening process documented in section 4, generated a list of designated sites and qualifying interest features (Table 4.1, Table 4.2, Table 4.3 and Table 4.5) for further determination of LSE as a result of the Proposed Development. This section of the LSE screening process therefore documents the determination of LSE for those European sites which have been identified for further consideration through section 4.

5.1. METHODOLOGY

153. The assessment of LSE in the following sections is presented as a series of matrices setting out whether no LSE can be concluded for the relevant features of the European sites identified in section 4.

154. The matrix approach adopted is based upon an approach set out within the Planning Inspectorate's Advice Note 10 on HRA (The Planning Inspectorate, 2017; Version 8) relating to Nationally Significant Infrastructure Projects (NSIPs). Although it is acknowledged that this guidance is not directly applicable to Scottish projects, the matrix approach used is considered to be a pragmatic approach and useful in defining the extent of impacts from the Proposed Development on identified designated sites' qualifying interest features, in relation to the sites' conservation objectives. It also provides a clear audit trail for agreement with the statutory consultees on the scope of the HRA and the features and impacts to be taken forward into the appropriate assessment for each site.

155. The following matrix key is applicable to the matrices presented in the subsequent sections:

- ✓ - Potential for a LSE/no LSE cannot be concluded
- × – No potential for an LSE
- C = Construction
- O&M = Operation and Maintenance
- D = Decommissioning

156. With respect to the consideration of mitigation at the LSE screening stage, in April 2018, the European Court of Justice issued a judgement in the People Over Wind and Sweetman case (Case C323/17) clarifying the stage in a HRA process when mitigation measures can be taken into account when assessing impacts on a European site. The ruling stated that "…in order to determine whether it is necessary to carry out, subsequently, an appropriate assessment of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site."

157. NatureScot interprets the judgement to mean that it is those measures specifically intended to avoid or reduce harmful effects to a European site which cannot be considered at the screening stage[7]. In accordance with this ruling (and the interpretation by NatureScot), measures intended to avoid or reduce harmful effects on a European site have not been applied in the course of this Screening exercise to discount the potential for LSE. Measures intended specifically to protect European sites are however, considered distinct from those which may incidentally protect European sites to a degree, but which are intrinsic parts of the Proposed Development. For example, offshore wind farms typically require post-consent plans which cover the construction and operation phases and includes planning for accidental spills and biosecurity measures to limit the potential spread of Invasive Non-Native Species (INNS) (e.g. a Project Environmental Management and Monitoring Plan (PEMMP)), irrespective of the possible effects on European sites. On the advice of NatureScot and the Scottish Ministers, the applicant has determined not to exclude such 'incidental' measures from the Proposed Development when undertaking Screening for LSE.

5.2. ASSESSMENT OF LSE FOR ANNEX I HABITATS (COASTAL AND SUBTIDAL)

158. A single European site, the Berwickshire and North Northumberland Coast SAC, was identified in the initial screening process (section 4) to be taken forward for determination of LSE for Annex I habitats.

5.2.2. SITE OVERVIEW

Berwickshire and North Northumberland SAC

159. The Berwickshire and North Northumberland Coast SAC is one of the most varied coastlines in the UK, stretching from Alnmouth to north of St Abbs head. The site contains a complex mix of marine habitats, associated species and communities which is unusually diverse for the North Sea, in both a UK and European context. The site contributes to an important range and variation of intertidal mudflats and sandflats and has one of the best examples of east coast clean sand and seagrass beds, and of moderately exposed reefs. Intertidal and submerged sea caves also contribute significantly to the site's overall habitat diversity and international importance (Natural England and NatureScot, 2021). The Natura 2000 standard data form for the site is provided in Appendix 1.

160. The qualifying interest features of this site are detailed in Table 5.3.

5.2.3. PATHWAYS FOR LSE: POTENTIAL IMPACTS ON ANNEX I HABITATS

161. There is considerable knowledge from previous offshore wind farm projects, including from Seagreen Alpha/Bravo, on the potential effects that the construction, operation and maintenance and decommissioning of an offshore wind farm may have on benthic receptors. In addition, the 'advice on operations' prepared jointly by Natural England and NS for the Berwickshire and North Northumberland Coast SAC site identifies the type of impacts that Annex I features are sensitive to for offshore wind farms and cables (Natural England and NatureScot, 2021). Using this information, together with the SNCBs responses to the Initial Berwick Bank Wind Farm Proposal LSE Screening Report (see below), a list of impacts that may result from the Proposed Development, and that need to be taken into account when determining the potential for LSE for the Berwickshire and North Northumberland Coast SAC, has been generated and are summarised in Table 5.1. For consistency with the EIA, the terminology adopted for describing the potential impacts identified in Table 5.1 for Annex I habitats (coastal and subtidal) is the same as that used in the EIA Offshore Scoping Report for the Proposed Development (SSER, 2021). This, however, differs to the terminology used in the advice on operations package for the site and so for clarity the equivalent terms, as used in the Natural England Advice Package for the Berwickshire and North Northumberland Coast SAC, are also given in Table 5.1.

[7] See The handling of mitigation in HRA (A2900547) (nature.scot)

Table 5.1: Potential Impacts Identified for Annex I Habitats and Equivalent Terms from the Advice on Operations Document for the Berwickshire and North Northumberland Coast SAC

Impact Description Used in HRA and EIA	Equivalent Pressure Defined for Site (Natural England and NatureScot, 2021)
Construction Phase	
Temporary habitat loss / disturbance	• Abrasion/disturbance of the substrate on the surface of the seabed. • Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion.
Increases in suspended sediment concentrations and sediment deposition	• Smothering and siltation rate changes (Light - Heavy). • Changes in suspended solids (water clarity). • Deoxygenation.
Release of sediment bound contaminants	• Hydrocarbon and polyaromatic hydrocarbon (PAH) contamination. • Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). • Transition elements and organo-metal (e.g. tributyl tin (TBT)) contamination.
Accidental pollution	• Hydrocarbon and PAH contamination. • Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). • Transition elements and organo-metal (e.g. TBT) contamination.
Operation and Maintenance Phase	
Long-term subtidal habitat loss	• Habitat structure changes - removal of substratum (extraction). • 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). • Physical loss (to land or freshwater habitat).
Temporary habitat loss / disturbance	• Abrasion/disturbance of the substrate on the surface of the seabed. • Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion.
Increases in suspended sediment concentrations and sediment deposition	• Smothering and siltation rate changes (Light - Heavy). • Changes in suspended solids (water clarity). • Deoxygenation.
Changes in physical processes	• Water flow (tidal current) changes, including sediment transport considerations.
Colonisation of hard structures	• Introduction or spread of invasive non-indigenous species (INNS). • Physical change (to another seabed type).
Electromagnetic fields (EMF) from subsea cabling	• Electromagnetic changes.
Accidental pollution	• Hydrocarbon and PAH contamination. • Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). • Transition elements and organo-metal (e.g. TBT) contamination.
Decommissioning Phase	
Removal of hard structures	• Habitat structure changes - removal of substratum (extraction). • Physical change (to another seabed type).
Release of sediment bound contaminants	• Hydrocarbon and PAH contamination. • Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals).
	• Transition elements and organo-metal (e.g. TBT) contamination.
Accidental pollution	• Hydrocarbon and PAH contamination. • Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). • Transition elements & organo-metal (e.g. TBT) contamination.

162. Consideration of the potential impacts identified for Annex I habitats is presented in the following sections to inform the determination of LSE in section 5.2.3.

Construction Phase

Temporary Habitat Loss / Disturbance

163. There is the potential for temporary, direct habitat loss and disturbance as a result of seabed preparation activities in advance of foundation installation, cable installation activities (including pre-cabling seabed clearance and anchor placements), and placement of jack-up barge legs on the seabed during the construction phase of the Proposed Development. This impact will be spatially restricted to within the footprint of the Proposed Development and, therefore, there is no potential for spatial overlap with any Annex I habitat features of the Berwickshire and North Northumberland Coast SAC.

164. There is considered to be no potential for LSE on any Annex I habitat features of the Berwickshire and North Northumberland Coast SAC as a result of temporary habitat loss/disturbance.

Increases in SSC and Sediment Deposition

165. Sediment disturbance arising from construction activities (e.g. foundation and cable installation, and seabed preparation works) may result in indirect impacts on benthic communities as a result of temporary increases in suspended sediment concentrations (SSCs) and associated sediment deposition (i.e. smothering effects). The extent of this impact will be spatially restricted to within the boundaries of the Proposed Development and the surrounding area (which will be refined through physical processes modelling to be undertaken for the EIA). Therefore, for the purposes of this LSE screening, there is considered to be potential for LSE on Annex I features of the Berwickshire and North Northumberland Coast SAC which are within the ZOI from increased SSC (defined as 20 km; see section 4.1).

166. On this basis, effects associated with the Proposed Development array area are screened out as the Proposed Development array area is located 36 km from the boundary of the Berwickshire and North Northumberland Coast SAC (see Table 4.1) and therefore outside the ZOI. There is only considered to be LSE from the activities along the proposed ECC as this lies within 3 km of the Berwickshire and North Northumberland Coast SAC (see Table 4.1) and therefore within the ZOI.

Release of Sediment Bound Contaminants

167. Seabed disturbance associated with construction (e.g. seabed preparation in advance of foundation and cable installation) could lead to the remobilisation of sediment-bound contaminants that may result in harmful and adverse effects on benthic communities. Site-specific benthic baseline characterisations surveys undertaken in support of the Proposed Development have, however, identified very low levels of

contamination within the sediments likely to be disturbed during construction activities. Levels of metals (see Table 5.2) were all at low levels and below the Marine Scotland chemical guideline Action Level 1 (AL1) and Action Level 2 (AL2). The majority of the metal contaminants also did not exceed the Canadian Threshold Effect Level (TEL), with the exception of arsenic at five sample stations within the Proposed Development Array Area; levels were however well below the Canadian Probable Effect Level (PEL) for arsenic (Table 5.2). Levels of organotins were very low (<0.005 mg/kg for dibutyltin and <0.002 mg/kg for tributyltin) and below the ALs. Levels of polyaromatic hydrocarbons (PAHs) were consistently very low (mostly below the limit of detection) and levels for all samples were found to be below AL1. Similarly, levels of polychlorinated biphenyl (PCB) congeners were below the limit of detection for each PCB at each sample station, and below the respective Marine Scotland ALs.

Table 5.2: Concentrations of Metals Recorded in Sediments within the Proposed Development Benthic Subtidal and Intertidal Ecology Study Area

Description (metals)	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
Units	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Detection Limit	0.5	0.1	0.5	0.5	0.5	0.01	0.5	3
MS AL1 (mg/kg)	20	0.4	50	30	50	0.25	30	130
MS AL2 (mg/kg)	70	4	370	300	400	1.5	150	600
Canadian TEL (mg/kg)	7.2	0.7	52.3	18.7	30.2	0.13	15.9	124
Canadian PEL (mg/kg)	41.6	4.2	160	108	112	0.7	-	271
Sample No.								
ST91	4.50	<0.10	22.40	2.80	9.30	<0.1	5.40	13.50
ST92	11.30*	<0.10	24.50	3.00	11.60	<0.01	4.90	14.90
ST93	7.50*	<0.10	24.00	3.20	9.40	<0.01	5.20	14.80
ST94	11.30*	<0.10	15.40	3.10	8.60	<0.01	6.00	14.40
ST95	10.70*	<0.10	26.20	3.30	11.20	<0.01	6.70	11.20
ST96	7.90*	<0.10	23.60	3.20	10.70	<0.01	5.50	17.60
ST97	4.40	<0.10	20.90	3.10	9.90	<0.01	6.20	46.00
ST98	6.30	0.20	35.20	4.60	13.80	<0.01	11.30	27.80
ST99	6.30	0.20	37.30	5.20	14.90	<0.01	11.70	30.60

* Indicates an exceedance of the Canadian TEL.

168. The low level of contaminants is likely due to the limited historic oil and gas activities in the vicinity of the Proposed Development, the nature of the sediments present (i.e. low levels of fines) and the large distance from shore which suggests a limited input from onshore sources. The levels of sediment bound contaminants present are not considered to be at concentrations likely to be harmful to benthic receptors or to present a risk to benthic receptors.

169. On this basis, there is considered to be no potential for LSE on any Annex I habitat features of Berwickshire and North Northumberland Coast SAC from this impact.

Accidental Pollution

170. There is a risk of pollution being accidentally released during the construction phase of the Proposed Development from sources including vessels/vehicles and equipment/machinery. It is anticipated that the risk of such events occurring will be managed by the implementation of measures set out in standard post consent plans (e.g. a PEMMP including a Marine Pollution Contingency Plan) which will be implemented as part of the Proposed Development irrespective of the HRA process. These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. It will also set out industry good practice and OSPAR (Oslo-Paris), International Maritime Organization (IMO) and MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at sea. Therefore the potential for LSE on Annex I habitat features of the Berwickshire and North Northumberland Coast SAC from accidental pollution can be discounted at this stage.

Operation and Maintenance Phase

Long-term Subtidal Habitat Loss

171. There is the potential for long-term habitat loss to occur directly under all foundation structures and associated scour protection, and under any cable protection required along the inter-array and export cables for the duration of the operation and maintenance phase. This impact will be spatially restricted to within the footprint of the Proposed Development and as there is no physical overlap between the site and the Proposed Development, there is no potential for LSE on any Annex I features of the Berwickshire and North Northumberland Coast SAC.

Temporary Habitat Loss / Disturbance

172. Temporary habitat loss/disturbance may occur during the operational and maintenance phase as a result of maintenance operations (e.g. cable repair/reburial, use of jack-up vessels to facilitate wind turbine component repairs etc.). This impact will be spatially restricted to within the footprint of the Proposed Development and as there is no physical overlap between the site and the Proposed Development, there is no potential for LSE on any Annex I habitat features of Berwickshire and North Northumberland Coast SAC as a result of temporary habitat loss/disturbance.

Increases in SSC and Sediment Deposition

173. Temporary increases in SSC and associated sediment deposition may arise during maintenance activities (e.g. cable reburial or replacement works) and may affect benthic communities. The magnitude of this impact will be substantially less than that during construction as no seabed preparation will be required. The extent of the impact will be spatially restricted to within the boundaries of the Proposed Development and the surrounding area (which will be refined through physical processes modelling to be undertaken for the EIA). Therefore, for the purposes of this LSE screening, there is considered to be potential for LSE on any Annex I features of the Berwickshire and North Northumberland Coast SAC which are within the ZOI from increased SSC (defined as 20 km; see section 4.1).

174. On this basis, effects associated with the Proposed Development array area are screened out as the Proposed Development array area is located 36 km from the boundary of the Berwickshire and North Northumberland Coast SAC (see Table 4.1) and therefore outside the ZOI. There is only considered to be LSE from the activities along the proposed ECC as this lies within 3 km of the Berwickshire and North Northumberland Coast SAC (see Table 4.1) and therefore within the ZOI.

Changes in Physical Processes

175. The presence of foundation structures, associated scour protection and cable protection may introduce localised changes to the tidal flow and wave climate, resulting in potential changes to the sediment transport pathways and associated effects on benthic ecology. The extent of the impact will be spatially restricted to within the boundaries of the Proposed Development and the surrounding area (which will be refined through physical processes modelling to be undertaken for the EIA). Therefore, for the purposes of this LSE screening, there is considered to be potential for LSE on Annex I features of the Berwickshire and North Northumberland Coast SAC which are within the ZOI (defined as 20 km; see section 4.1).

176. On this basis, effects associated with the Proposed Development array area are screened out as the Proposed Development array area is located 36 km from the boundary of the Berwickshire and North Northumberland Coast SAC (see Table 4.1) and therefore outside the ZOI. There is only considered to be LSE from the presence of physical structures (e.g. cable protection) along the proposed offshore ECC as this lies within 3 km of the Berwickshire and North Northumberland Coast SAC (see Table 4.1) and therefore within the ZOI.

Colonisation of Hard Structures

177. Artificial structures placed on the seabed (i.e. foundations and scour/cable protection) in the offshore environment are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity and changes in community composition. These structures may also facilitate the spread of marine INNS. Protection against bio-invasion risk is provided by assumed compliance with international legislation, guidelines, and methodologies.[8] Further the initial risk of introduction of marine INNS resulting from the Proposed Development will be limited by good practice measures to reduce the potential for release and spread of INNS and to provide a process to deal with any should they occur. These measures would be implemented irrespective of the HRA process are not in place to protect European sites.

178. The environmental risk associated with invasive species is considered to be relative to the capacity for a new species to enter a new environment and spread. The greatest risk exists where new opportunities are provided for novel invasive species. Although there would be new infrastructure as a result of the Proposed Development, there is not considered to be a new route to impact due to the presence of other local offshore wind farms and major shipping lanes off the east coast of Scotland. It is considered that the addition of hard substratum in the array and EEC and infrastructure associated with the Proposed Development would not create any new connectivity routes or "stepping-stones" that were previously absent. As there is already a potential for marine INNS to occur due to the presence of other local offshore wind farms and major shipping lanes off the east coast of Scotland, it is considered that there is no additional risk posed by the Proposed Development. Further, there is also no physical overlap between the Proposed Development and the European site and adherence to international law and good practice would further reduce the low risk of bio-invasions associated with the Proposed Development. As such, there is considered to be no potential for LSE on any Annex I habitat features of Berwickshire and North Northumberland Coast SAC from this impact.

[8] Such as The European Union's Regulation on the prevention and management of the introduction and spread of invasive alien species (IAS) (EU, 2014)

EMF from Subsea Cabling

179. Electromagnetic fields (EMF) generated through the subsea electrical cabling may affect benthic subtidal and intertidal ecology by inhibiting/interfering with behaviours of the relevant benthic receptors. Research has demonstrated that even when buried, emission of EMF can impact the behaviour of invertebrates (Hutchison *et al.,* 2020). Any impacts associated with EMF will be spatially restricted to within the footprint of the Proposed Development and as there is no physical overlap between the site and the Proposed Development, there is considered to be no potential for LSE on any Annex I habitat features of the Berwickshire and North Northumberland Coast SAC as a result of EMF effects.

Accidental Pollution

180. The potential for LSE on any Annex I habitat features of the Berwickshire and North Northumberland Coast SAC as a result of accidental pollution can be discounted at this stage. The justification is as presented in section 5.2.3 – Construction Phase: Accidental Pollution.

Decommissioning Phase

181. The impacts during the decommissioning phase are considered to be similar and potentially less than those outlined in the construction phase (see section 5.2.3 – Construction Phase). The only additional impact, unique to the decommissioning phase, is the removal of hard substrates which is considered below.

Removal of Hard Structures

182. The removal of foundations and any scour/cable protection during decommissioning has the potential to lead to loss of species/habitats colonising these structures. Such effects will be highly localised and small scale and, as there is no physical overlap between the Proposed Development and the site, there is considered to be no potential for LSE on any Annex I habitat features of the Berwickshire and North Northumberland Coast SAC as a result the removal of hard substrates.

5.2.4. DETERMINATION OF LSE FOR ANNEX I HABITATS

183. Table 5.3 presents the results of the LSE determination assessment as a result of the Proposed Development on relevant qualifying interest features of the Berwickshire and North Northumberland Coast SAC in the absence of mitigation measures. The footnotes to this table provide a brief assessment to support the screening in or out of each of these likely significant effects on the identified SAC features. Where effects are not applicable to a particular feature they are greyed out.

Likely Significant Effects in combination

184. The LSE test requires consideration of the Proposed Development alone and/ or in-combination with other plans and projects. Therefore, it is not necessary at the LSE stage to consider sites/features for which an LSE 'alone' has already been identified, as in-combination effects will be considered at the Appropriate Assessment. The focus at this stage should be to identify sites/features for which no LSE alone was

concluded, but there is potential for a LSE in-combination with other plans and projects (e.g. where contributions are made by a number of external projects as well as the Proposed Development).

185. Given the highly precautionary method for site selection applied during this Screening assessment, it is considered that the consolidation of information regarding external plans and projects would not likely result in additional LSEs being identified for the Screening assessment.

186. For Annex I habitats, the potential for LSE alone is identified for all sites within the widest ranging effect, therefore effects in-combination will be considered at Appropriate Assessment. For effects discounted for LSE alone, there is either no pathway to effect, or the Proposed Development would result in only negligible or inconsequential effects that would not contribute (even collectively) in a material way to in-combination effects and therefore, no additional in-combination issues are identified.

Table 5.3: LSE Matrix for Annex I Habitats of the Berwickshire and North Northumberland Coast SAC

European Site Interest Qualifying Features	Temporary Habitat Loss / Disturbance			Increases in SSC and Sediment Deposition			Release of Sediment Bound Contaminants			Long-term Subtidal Habitat Loss			Colonisation of Hard Structures			Changes in Physical Processes			EMF			Removal of Hard Structures			Accidental Pollution			In-combination effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Mudflats and sandflats not covered by seawater at low tide	×a	×a	×a	✓b	✓b	✓b	×c		×c		×d			×e			✓f			×g				×h	×i	×i	×i	✓j	✓j	✓j
Large shallow inlets and bays	×a	×a	×a	✓b	✓b	✓b	×c		×c		×d			×e			✓f			×g				×h	×i	×i	×i	✓j	✓j	✓j
Reefs	×a	×a	×a	✓b	✓b	✓b	×c		×c		×d			×e			✓f			×g				×h	×i	×i	×i	✓j	✓j	✓j
Submerged or partially submerged sea caves	×a	×a	×a	✓b	✓b	✓b	×c		×c		×d			×e			✓f			×g				×h	×i	×i	×i	✓j	✓j	✓j

a: **Temporary habitat loss/disturbance** – there will be no direct physical overlap between any of the activities associated with the Proposed Development and the Annex I habitat features of the SAC. It can, therefore, be concluded that there is no potential for LSE on any Annex I habitat features of the site across all phases of the Proposed Development from temporary habitat loss/disturbance.

b: **Increases in SSC and sediment deposition** - the extent of this impact will be spatially restricted to within the boundaries of the Proposed Development and the surrounding area (which will be refined through physical processes modelling to be undertaken for the EIA). Effects on benthic habitats from activities within the Proposed Development array area across all phases are screened out on the basis of the distance of the Proposed Development array area from the site (36 km). Effects are only likely to arise from works along the proposed ECC and, until the Proposed Development ECC is refined, it is considered that there is potential for LSE on all Annex I habitat features of the site during ECC works only.

c: **Release of sediment bound contaminants** – the site-specific survey data has demonstrated that the levels of sediment bound contaminants present in the sediments likely to be disturbed are very low and at concentrations which are unlikely to be harmful to, or represent a risk to, benthic receptors. On this basis, it is not considered that there is potential for LSE on any Annex I habitat features of the site from the release of sediment bound contaminants.

d: **Long-term subtidal habitat loss** – there will be no direct physical overlap between the footprint of the Proposed Development and the Annex I habitat features of the SAC. It can therefore be concluded that there is no potential for LSE on any Annex I habitat features of the site from long-term habitat loss.

e: **Colonisation of hard structures** – Protection against bio-invasion risk is provided by assumed compliance with international legislation, guidelines, and methodologies. The initial risk of introduction of marine INNS will further be limited by good practice measures to reduce the potential for release and spread of INNS and to provide a process to deal with any should they occur. Although there would be new infrastructure as a result of the Proposed Development, there is not considered to be a new route to impact, due to the presence of other local offshore wind farms and major shipping lanes off the east coast of Scotland. As the movement of commercial vessels is common throughout the region and hard substrates are already prevalent throughout the region, the Proposed Development would not create any new ‘connectivity routes’ or "stepping-stones" that were previously absent. Given these factors and that there is no physical overlap between the Proposed Development and the site, it can therefore be concluded that there is no potential for LSE on any Annex I habitat features of the site as a result of the colonisation of hard substrates.

f: **Changes in physical processes** – effects associated with the Proposed Development array area are screened out on the basis of distance. There is considered to be potential for LSE on all Annex I habitat features of the site during the operation and maintenance phase from the proposed ECC only.

g: **EMF** - there will be no direct physical overlap between the cabling associated with the Proposed Development and the Annex I habitat features of the SAC. It can, therefore, be concluded that there is no potential for LSE on any Annex I habitat features of the site from EMF effects during the operation and maintenance phase.

h: **Removal of hard structures** - there is no physical overlap between the Proposed Development and the site. It can, therefore, be concluded that there is no potential for LSE on any Annex I habitat features of the site from the removal of hard substrate during the decommissioning phase.

i: **Accidental pollution** – a good practice approach will be implemented as part of the Proposed Development via post-consent plans (e.g. a PEMMP) to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development irrespective of the possible effects on European sites. Following advice from NS (2021) and MSS (2021), accidental pollution associated with construction activities is not considered as an effect pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans. This rationale is taken to apply to all phases of the Proposed Development. On this basis and given the distance of the Proposed Development array area from the site (36 km), the potential for LSE is therefore discounted.

j: **In-combination effects** - Activities associated with planned projects or other activities in the vicinity of the Proposed Development have the potential to result in LSE to Annex I habitat features of the SAC as a result of in-combination effects across all phases. Where potential for LSE has been concluded alone, the potential for LSE has been concluded in-combination. For effects discounted for LSE alone, there is either no pathway to effect, or the Proposed Development would result in only negligible or inconsequential effects that would not contribute (even collectively) a materially to in-combination effects and therefore, no additional in-combination issues are identified.

5.3. ASSESSMENT OF LSE FOR ANNEX II DIADROMOUS FISH

187. A total of six European sites were identified in the initial screening process (section 4) to be taken forward for determination of LSE for Annex II diadromous fish species. These sites are:

- Tweed Estuary SAC;
- River Tweed SAC;
- River South Esk SAC;
- River Tay SAC;
- River Dee SAC; and
- River Teith SAC.

5.3.2. SITE OVERVIEWS

188. The following sections provide a brief overview of each of the sites brought forward for consideration of LSE and a summary of their designated features. The Natura 2000 standard data forms are provided in Appendix 1 for all sites.

Tweed Estuary SAC

189. The Tweed Estuary SAC is a complex estuary located on the north east coast of England flowing into the North Sea (see Figure 4.2). The site is designated for migratory river lamprey and sea lamprey. Sea and river lamprey are present in the spring when adults pass through the estuary to spawn in silt and sand beds in the river upstream (JNCC, 2020a). Adjoining upstream of the Tweed Estuary SAC is the River Tweed SAC (see River Tweed SAC below).

River Tweed SAC

190. The River Tweed SAC (see Figure 4.2) is designated for Atlantic salmon, sea lamprey and river lamprey. The site supports a very large, high-quality salmon population in a river which drains a large catchment on the east coast of the UK, with sub-catchments in both Scotland and England. The high proportion of the River Tweed accessible to salmon, and the variety of habitat conditions in the river, have resulted in the Scottish section of the river supporting the full range of salmon life-history types, with sub-populations of spring, summer salmon and grilse all being present (JNCC, 2020b). The run-timing of adult salmon returning to the River Tweed SAC has changed very considerably in just the last few years. Previously, September and October were the main months of return, this is now July to August (RTC, 2021). Sea and river lamprey are also widespread within the site (JNCC, 2020b).

River South Esk SAC

191. The River South Esk SAC (see Figure 4.2) is designated for Atlantic salmon and the freshwater pearl mussel. Atlantic salmon are found throughout the site. The high proportion of the South Esk which is accessible to salmon, and the range of ecological conditions in the river allows it to support the full range of life-history types of Atlantic salmon found in Scotland, with sub-populations of spring, summer salmon and grilse all being present (SNH, 2011).

192. Freshwater pearl mussels are abundant in the River South Esk, representing the south-eastern range of the species in Scotland. The freshwater pearl mussel population is most abundant in the middle reaches of the river where they attain densities of more than 20 individuals per m-2. The conservation importance of the site is further increased by the abundance of juvenile freshwater pearl mussels which comprise approximately 20% of the population (JNCC, 2020c).

River Tay SAC

193. The River Tay SAC (see Figure 4.2) is designated for Atlantic salmon, river lamprey and sea lamprey. The River Tay supports a high-quality Atlantic salmon population, with rod catch returns showing that the Tay is consistently one of the top three salmon rivers in Scotland (JNCC, 2020d). The Tay supports the full range of Atlantic salmon life-history types found in Scotland, with adult salmon entering the River Tay throughout the year to spawn in different parts of the catchment. Sea and river lamprey are also widespread within the site and the site is likely to support one of the most important sea lamprey populations in Scotland (JNCC, 2020d).

River Dee SAC

194. The River Dee (see Figure 4.2) is a major east coast Scottish river which has been designated for freshwater pearl mussel and Atlantic salmon. Freshwater pearl mussel are present from approximately 30 km from the river source to approximately 6-7 km upstream from its mouth. Juvenile freshwater pearl mussel make up approximately 30% of the recorded population, which is among the highest proportions recorded in Scotland. This indicates that the population is recruiting strongly and is one of the most important in the UK.

195. The site supports the full range of life-history types of Atlantic salmon found in Scotland, with sub-populations of spring, summer salmon and grilse all being present. The headwaters which drain the southern Cairngorm and northern Grampian mountains are particularly important for multi sea-winter spring salmon, but there has been a significant decline in their abundance in recent years. The extensive areas accessible to salmon means the River Dee supports a significant proportion of the Scottish salmon resource (JNCC, 2020e). The Dee has been categorised as a Grade 1 river, meaning that the stocks have most likely been above the critical threshold - the Conservation Limit - over the last five years (DDSFB, 2021). Further assessment of the juvenile salmon stocks in the Dee through the National Electrofishing Programme for Scotland (NEPS) programme has assessed the juvenile stocks in the Dee as being Grade 2, suggesting that there are significant issues with recruitment and survival within the catchment (Malcolm *et al.,* 2020).

River Teith SAC

196. The River Teith SAC (see Figure 4.2) is designated for Atlantic salmon, river lamprey and sea lamprey. The River Teith represents part of the east coast range of the sea lamprey in the UK and young sea lampreys have been recorded throughout the lower reaches of the main river. The site also supports a strong population of river lamprey and as the river lacks any significant artificial barriers to migration, has good water quality and the necessary habitat types (extensive gravel beds and marginal silt beds), it supports the river lamprey's full life-cycle (JNCC, 2020f). The River Teith SAC also supports a significant population of Atlantic salmon and although this species is a qualifying feature of the site, it is not a primary reason for its designation.

5.3.3. PATHWAYS FOR LSE: POTENTIAL IMPACTS ON ANNEX II DIADROMOUS FISH

197. A list of potential impacts and effects on diadromous fish that may result from the Proposed Development has been provided below. These are the impacts which must be taken into account when determining the potential for LSE on the designated sites and qualifying fish features identified in section 4.2. The list of

potential impacts has been compiled using the experience and knowledge gained from previous offshore wind farm projects and Natural England's 'advice on operations' (Natural England, 2020a and Natural England, 2020b), and the pressures data available on Scotland's environment web (https://www.environment.gov.scot/) for individual features of sites. The list of potential impacts has also been informed by the SNCBs responses to the Initial Berwick Bank Wind Farm Proposal LSE Screening Report (see Table 1.1 and below). Consideration of the potential impacts identified for Annex II diadromous fish species is presented in the following sections to inform the determination of LSE in section 5.3.3.

Construction Phase

Temporary Habitat Loss / Disturbance

198. There is potential for temporary, direct habitat loss and disturbance as a result of seabed preparation activities in advance of foundation installation, cable installation activities (including pre-cabling seabed clearance and anchor placements), and placement of spud-can legs during jack-up operations during the construction phase of the Proposed Development. This impact will be spatially restricted to within the footprint of the Proposed Development. No European sites with Annex II diadromous fish species physically overlap with the Proposed Development (see Figure 4.2) and so there is no potential for direct impacts to supporting habitats for Annex II diadromous fish species within any site. There is the potential for migratory fish to be present in the waters in and around the Proposed Development, and to be affected by temporary habitat loss/disturbance (e.g. effects on feeding grounds). Similar habitats are however widespread within this part of the North Sea and it is considered that there would be no barrier effects to migratory fish reaching the designated sites as a result of this impact. Furthermore, any impacts to supporting habitats such as foraging grounds outside the designated sites would be temporary and would not be expected to result in any long-term effects on the availability of food in the area. On this basis there is considered to be no potential for LSE on any Annex II fish species of any of the European sites screened in as a result of temporary habitat loss/disturbance. This impact is screened out for all sites.

Increases in SSC and Sediment Deposition

199. Sediment disturbance arising from construction activities (e.g. foundation and cable installation, and seabed preparation works) may result in temporary, indirect impacts on diadromous fish as a result of temporary increases in SSCs. The extent of this impact will be spatially restricted to within the boundaries of the Proposed Development and the surrounding area. This distance will be refined through physical processes modelling to be undertaken for the EIA but for the purposes of this LSE screening is defined as a precautionary distance of 20 km from the boundary of the Proposed Development (see section 4.1). There are no sites within this ZOI and so there is no potential for direct impacts to supporting habitats for Annex II diadromous fish species within any European site. There is the potential for migratory fish to be present in the waters in and around the Proposed Development and to be affected by increased SSC and deposition (e.g. effects on feeding and feeding grounds). Similar habitats are however widespread within this part of the North Sea and given the highly mobile nature of migratory fish it is anticipated that they will be able to avoid areas of temporary increases in SSC and seek alternative foraging grounds in the vicinity. Any effects, should they occur would be temporary and intermittent and would not be expected to result in any long-term effects on the availability of food in the area. On this basis, there is considered to be no potential for LSE on any Annex II features of European sites as a result of increased SSC during construction activities. This impact is screened out for all sites.

Underwater Noise

200. There is potential for mortality, injury and/or disturbance to migratory fish as a result of construction activities including pile-driving to install foundations and clearance of UXOs, as well as construction/installation vessel noise. The greatest potential for noise to be generated will occur within the Proposed Development array area as a result of piling activities and UXO clearance. SSER also acknowledges advice received from the SNCBs that there will be stages when fish do not move much at all, for example salmon are likely to aggregate in the open sea near river mouths, prior to the upriver migration (e.g., Matz, 2014). The nearest European site with Annex II diadromous fish qualifying interest features is located 44.5 km from the Proposed Development array area (see Figure 4.2), but there is potential for migratory species to be present within or transiting through the Proposed Development array area and potential area of impact. The zone of impact will be determined for the EIA through noise modelling and therefore, at this stage of the development process, the potential for LSE on any Annex II features of European sites as a result of underwater noise arising from construction activities cannot be excluded. Underwater noise is therefore screened in for further consideration for diadromous fish.

Accidental Pollution

201. There is a risk of pollution being accidentally released during the construction phase of the Proposed Development from sources including vessels/vehicles and equipment/machinery. The risk of such events occurring will be managed by the implementation of measures set out in standard post consent plans (e.g. a PEMMP including a Marine Pollution Contingency Plan) which will be implemented as part of the Proposed Development, notwithstanding potential pathways to European sites. These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. They will also set out industry good practice and OSPAR, IMO and MARPOL guidelines for preventing pollution at sea. Following advice from NS (2021) and MSS (2021), accidental pollution associated with construction activities is not considered as an effect pathway because of the wider regulatory controls as above (not associated with HRA) that govern the requirement for these contingency plans.

Operation and Maintenance Phase

Temporary Habitat Loss / Disturbance

202. Temporary habitat loss/disturbance may occur during the operational and maintenance phase of the Proposed Development as a result of maintenance operations (e.g. cable repair/reburial, use of jack-up vessels to facilitate wind turbine component repairs etc.). This impact will be spatially restricted to within the footprint of the Proposed Development and there is no physical overlap with the Proposed Development and any European sites (see Figure 4.2) and so there is no potential for direct impacts to supporting habitats for Annex II diadromous fish species within any site. There is the potential for migratory fish to be present in the waters in and around the Proposed Development, and to be affected by temporary habitat loss/disturbance (e.g. effects on feeding grounds). Similar habitats are however widespread within this part of the North Sea and it is considered that there would be no barrier effects to migratory fish reaching the designated sites as a result of this impact. Furthermore, any impacts to supporting habitats such as foraging grounds outside the designated sites would be temporary and would not be expected to result in any long-term effects on the availability of food in the area. On this basis, there is considered to be no potential for LSE on any Annex II diadromous fish qualifying interest features of European sites as a result of temporary habitat loss/disturbance and so this impact is screened out from further consideration.

Increases in SSC and Sediment Deposition

203. Temporary increases in SSC and associated sediment deposition may arise during maintenance activities (e.g. cable reburial or replacement works). The magnitude of this impact will be substantially less than that during construction as no seabed preparation will be required for these activities. The extent of the impact will be spatially restricted to within the boundaries of the Proposed Development and the surrounding area (which will be refined through physical processes modelling to be undertaken for the EIA). This distance will be refined through physical processes modelling to be undertaken for the EIA but for the purposes of this LSE screening is defined as a precautionary distance of 20 km from the boundary of the Proposed Development (see section 4.1). There are no European sites within this ZOI and so there is no potential for direct impacts to supporting habitats for Annex II diadromous fish species within any European site. There is the potential for migratory fish to be present in the waters in and around the Proposed Development and to be affected by increased SSC and deposition (e.g. effects on feeding and feeding grounds). Similar habitats are however widespread within this part of the North Sea and given the highly mobile nature of migratory fish it is anticipated that they will be able to avoid areas of temporary increases in SSC, and seek alternative foraging grounds in the vicinity. Any effects, should they occur would be temporary and intermittent and would not be expected to result in any long-term effects on the availability of food in the area. On this basis, there is considered to be no potential for LSE on any Annex II features of European sites as a result in increased SSC during maintenance activities and so this impact is screened out of further consideration.

Underwater Noise

204. During the operation and maintenance phase there is the potential for noise generated by the operational wind turbines, and from vessels undertaking operation and maintenance activities to result in disturbance to migratory fish as they pass through the Proposed Development. The operational noise from wind turbines is however of a very low frequency and low sound pressure level (Andersson *et al.,* 2011). Studies have found that sound levels are only high enough to have the potential to cause a behavioural reaction within metres from a wind turbine (Sigray and Andersson 2011; Andersson *et al.,* 2011) and therefore such levels are not considered likely to result in significant effects on diadromous fish species. Similarly, underwater noise generated from operation and maintenance vessels is likely to be at a low level and effects would only occur if fish remain within the immediate vicinity of the vessel (i.e. within metres) for a number of hours which is unlikely given the likely movements that the majority of vessels (e.g. crew transfer vessels etc.) will be making within the Proposed Development. It is therefore considered that there is no potential for LSE on any Annex II diadromous fish qualifying interest features of European sites as a result of underwater noise during the operation and maintenance phase and this impact is screened out of further consideration for all sites.

Long-term Habitat Loss

205. There is the potential for long-term habitat loss to occur directly under all foundation structures and associated scour protection, and under any cable protection required along the inter-array and offshore export cable for the duration of the operation and maintenance phase. This impact will be spatially restricted to within the footprint of the Proposed Development and there is no physical overlap between the Proposed Development and any European sites (see Figure 4.2). As such, there is no potential for direct impacts to supporting habitats for Annex II diadromous fish species within any site. There is the potential for migratory fish to be present in the waters in and around the Proposed Development, and to be affected by long-term habitat loss (e.g. loss of feeding grounds). Similar habitats are however widespread within this part of the North Sea and the areas of seabed impacted by long term loss will be discreet and small in the content of the habitats present in the wider area. Furthermore, it is considered that there would be no barrier effects to migratory fish reaching the designated sites as a result of this impact. Any impacts to supporting habitats such as foraging grounds outside the designated sites would be localised and would not be expected to result in any long-term effects on the availability of food in the area. On this basis, there is no potential for LSE on any Annex II diadromous fish qualifying interest features of European sites as a result of long-term habitat loss, and this impact is screened out from further consideration.

Electromagnetic Fields (EMF)

206. The presence of subsea electrical cabling has the potential to emit a localised EMF which may interfere with the navigation of migratory fish, particularly in shallow nearshore waters (Gill and Bartlett, 2010). At this stage, the potential for LSE on Annex II features of European sites as a result of EMF from subsea cabling cannot be excluded.

Colonisation of Hard Structures

207. Artificial structures placed on the seabed (i.e. foundations and scour/cable protection) in the offshore environment are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity and potential changes in prey-predator interactions. These structures may also facilitate the spread of marine invasive and non-native species (INNS). Further, the introduction of hard substrate into the marine environment could increase the time fish would spend in the vicinity of the structures (known as the fish aggregation (or reef) effect. While it is anticipated that the risk of bio-invasion and the spread of marine INNS is low (as set out in the discussion of the risk to Annex I habitats), due to the specific dynamics that relate to fish (and predator prey relationships) the potential for LSE on Annex II diadromous fish features of European sites from effects associated with the colonisation of hard structures, including changes to predator-prey interactions, cannot be discounted at this stage.

Accidental Pollution

208. The potential for LSE on Annex II diadromous features of European sites as a result of accidental pollution can be discounted at this stage. The justification is as presented previously in section 5.3.3 - Construction Phase: Accidental Pollution.

Decommissioning Phase

209. The potential for impacts during the decommissioning phase are considered to be similar and potentially less than those outlined above in the construction phase (section 5.3.3 - Construction Phase) and have not been reiterated.

5.3.4. DETERMINATION OF LSE FOR ANNEX II DIADROMOUS FISH SPECIES

210. Table 5.4 to Table 5.9 presents the results of the LSE determination assessment as a result of the Proposed Development on relevant qualifying interest features of the Tweed Estuary SAC, River Tweed SAC, River South Esk SAC, River Tay SAC, River Dee SAC and the River Teith SAC, respectively. These assessments are made in the absence of mitigation measures. The footnotes to the following tables provide a brief assessment to support the screening in or out of each of the likely significant effects on the identified SAC features. Where effects are not applicable to a particular feature they are greyed out.

Likely Significant Effects in combination

211. The LSE test requires consideration of the Proposed Development alone and/ or in-combination with other plans and projects. Therefore, it is not necessary at the LSE stage to consider sites/features for which an LSE 'alone' has already been identified, as in-combination effects will be considered at the Appropriate Assessment. The focus at this stage should be to identify sites/features for which no LSE alone was concluded, but there is potential for a LSE in-combination with other plans and projects (e.g. due to wide foraging ranges resulting in a species interacting with a large number of projects).

212. Given the highly precautionary method for site selection applied during this Screening assessment, it is considered that the consolidation of information regarding external plans and projects would not likely result in additional European sites or new effect pathways being identified for the Screening assessment.

213. For diadromous fish species, the potential for LSE alone is identified for all sites with the potential to be affected, therefore effects in-combination will be considered at Appropriate Assessment.

Table 5.4: LSE Matrix for Annex II Diadromous Fish Species of the Tweed Estuary SAC

European Site Qualifying Interest Features	Temporary Habitat Loss/Disturbance			Increases in SSC and Sediment Deposition			Underwater Noise			Long-term Habitat Loss			EMF			Colonisation of Hard Structures			Accidental Pollution			In-combination effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Sea lamprey (*Petromyzon marinus*)	×a	×a	×a	×b	×b	×b	✓c	×c	✓c		×d			✓e			✓f		×g	×g	×g	✓h	✓h	✓h
River lamprey (*Lampetra fluviatilis*)	×a	×a	×a	×b	×b	×b	✓c	×c	✓c		×d			✓e			✓f		×g	×g	×g	✓h	✓h	✓h

a: **Temporary habitat loss/disturbance** – there is no potential for any direct physical overlap between the activities associated with all phases of the Proposed Development and the boundary of the European site. It can, therefore, be concluded that there is no potential for LSE on any Annex II diadromous fish qualifying interest features of the site from temporary habitat loss/disturbance.

b: **Increases in SSC and sediment deposition** - the extent of this impact, across all phases of the Proposed Development, will be spatially restricted to within the boundaries of the Proposed Development and the surrounding area (which will be refined through physical processes modelling to be undertaken for the EIA). Due to the distance between the Proposed Development and this site (29.0 km from the ECC and 42.0 km from the Proposed Development Array Area) and the highly mobile nature of migratory fish, it is concluded that there is no potential for LSE on any Annex II diadromous fish qualifying interest features of the site.

c: **Underwater noise** - there is potential for migratory species to be present within or transiting through the Proposed Development Array Area and potential area of impact (injury and behavioural) from underwater noise during construction and decommissioning. There is therefore considered to be the potential for LSE on Annex II diadromous fish features of the site during the construction and decommissioning phases. Noise levels will be substantially lower during the operation and maintenance phase and, as such, it is concluded that there is no potential for LSE on Annex II diadromous fish qualifying interest features of the site during the operation and maintenance phase.

d: **Long-term habitat loss** - there is no direct physical overlap between the footprint of the Proposed Development and the SAC. It can therefore be concluded that there is no potential for LSE on any Annex II diadromous fish qualifying interest features of the site from long-term habitat loss.

e: **EMF** – EMF emitted from subsea electrical cabling has the potential to interfere with the navigation of migratory fish. It is considered that there is potential for LSE on the Annex II diadromous fish qualifying interest features of the site from EMF during the operation and maintenance phase.

f: **Colonisation of hard structures** – artificial structures placed on the seabed (i.e. foundations and scour/cable protection) are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity and potential changes in prey-predator interactions. It is considered that there is potential for LSE on the Annex II diadromous fish qualifying interest features of the site from the colonisation of hard structures during the operation and maintenance phase.

g: **Accidental pollution** – a good practice approach will be implemented as part of the Proposed Development via post-consent plans (e.g. a PEMMP) to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, irrespective of the possible effects on European sites. Following advice from NS (2021) and MSS (2021), accidental pollution associated with construction activities is not considered as an effect pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans. This rationale is taken to apply to all phases of the Proposed Development and the potential for LSE is discounted.

h: **In-combination effects** - Activities associated with planned projects or other activities in the vicinity of the Proposed Development have the potential to result in LSE to Annex II diadromous fish qualifying interest features of the site as a result of in-combination effects across all phases. Where potential for LSE has been concluded alone, the potential for LSE has been concluded in-combination.

Table 5.5: LSE Matrix for Annex II Diadromous Fish Species of the River Tweed SAC

European Site Qualifying Interest Features	Temporary Habitat Loss/Disturbance			Increases in SSC and Sediment Deposition			Underwater Noise			Long-term Habitat Loss			EMF			Colonisation of Hard Structures			Accidental Pollution			In-combination effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Atlantic salmon (*Salmo salar*)	×a	×a	×a	×b	×b	×b	✓c	×c	✓c		×d			✓e			✓f		×g	×g	×g	✓h	✓h	✓h
Sea lamprey (*Petromyzon marinus*)	×a	×a	×a	×b	×b	×b	✓c	×c	✓c		×d			✓e			✓f		×g	×g	×g	✓h	✓h	✓h
River lamprey (*Lampetra fluviatilis*)	×a	×a	×a	×b	×b	×b	✓c	×c	✓c		×d			✓e			✓f		×g	×g	×g	✓h	✓h	✓h

a: **Temporary habitat loss/disturbance** – there is no potential for any direct physical overlap between the activities associated with all phases of the Proposed Development and the boundary of the European site. It can, therefore, be concluded that there is no potential for LSE on any Annex II diadromous fish qualifying interest features of the site from temporary habitat loss/disturbance.

b: **Increases in SSC and sediment deposition** - the extent of this impact, across all phases of the Proposed Development, will be spatially restricted to within the boundaries of the Proposed Development and the surrounding area (which will be refined through physical processes modelling to be undertaken for the EIA). Due to the distance between the Proposed Development and this site (33.6 km from the ECC and 46.6 km from the Proposed Development Array Area) and the highly mobile nature of migratory fish, it is concluded that there is no potential for LSE on any Annex II diadromous fish qualifying interest features of the site as a result of increased SSC and deposition.

c: **Underwater noise** - there is potential for migratory species to be present within or transiting through the Proposed Development Array Area and potential area of impact (injury and behavioural) from underwater noise during construction and decommissioning. There is therefore considered to be the potential for LSE on Annex II diadromous fish features of the site during the construction and decommissioning phases. Noise levels will be substantially lower during the operation and maintenance phase and, as such, it is concluded that there is no potential for LSE on any Annex II diadromous fish qualifying interest features of the site during the operation and maintenance phase.

d: **Long-term habitat loss** - there is no direct physical overlap between the footprint of the Proposed Development and the SAC. It can therefore be concluded that there is no potential for LSE on Annex II diadromous fish qualifying interest features of the site from long-term habitat loss.

e: **EMF** – EMF emitted from subsea electrical cabling has the potential to interfere with the navigation of migratory fish. It is considered that there is potential for LSE on Annex II diadromous fish qualifying interest features of the site from EMF during the operation and maintenance phase.

f: **Colonisation of hard structures** – artificial structures placed on the seabed (i.e. foundations and scour/cable protection) are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity and potential changes in prey-predator interactions. It is considered that there is potential for LSE on Annex II diadromous fish qualifying interest features of the site from the colonisation of hard structures during the operation and maintenance phase.

g: **Accidental pollution** – a good practice approach will be implemented as part of the Proposed Development via post-consent plans (e.g. a PEMMP) to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, irrespective of the possible effects on European sites. Following advice from NS (2021) and MSS (2021), accidental pollution associated with construction activities is not considered as an effect pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans. This rationale is taken to apply to all phases of the Proposed Development and the potential for LSE is discounted.

h: **In-combination effects** - Activities associated with planned projects or other activities in the vicinity of the Proposed Development have the potential to result in LSE to Annex II diadromous fish qualifying interest features of the site as a result of in-combination effects across all phases. Where potential for LSE has been concluded alone, the potential for LSE has been concluded in-combination.

Table 5.6: LSE Matrix for Annex II Qualifying Features of the River South Esk SAC

European Site Qualifying Interest Features	Temporary Habitat Loss/Disturbance			Increases in SSC and Sediment Deposition			Underwater Noise			Long-term Habitat Loss			EMF			Colonisation of Hard Structures			Accidental Pollution			In-combination effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Atlantic salmon (*Salmo salar*)	×a	×a	×a	×b	×b	×b	✓c	×c	✓c		×d			✓e			✓f		×g	×g	×g	✓h	✓h	✓h
Freshwater pearl mussel (*Margaritifera margaritifera*)	×a	×a	×a	×b	×b	×b	✓c	×c	✓c		×d			✓e			✓f		×g	×g	×g	✓h	✓h	✓h

a: **Temporary habitat loss/disturbance** – there is no potential for any direct physical overlap between the activities associated with all phases of the Proposed Development and the boundary of the European site. It can, therefore, be concluded that there is no potential for LSE on any Annex II species that are qualifying features of the site from temporary habitat loss/disturbance.

b: **Increases in SSC and sediment deposition** - the extent of this impact, across all phases of the Proposed Development, will be spatially restricted to within the boundaries of the Proposed Development and the surrounding area (which will be refined through physical processes modelling to be undertaken for the EIA). Due to the distance between the Proposed Development and this site (44.5 km from the Proposed Development Array Area and 79.0 km from the ECC) and highly mobile nature of migratory fish, it is concluded that there is no potential for LSE on any Annex II species that are qualifying features of the site.

c: **Underwater noise** - there is potential for Atlantic salmon smolts and/or adults to be present within or transit through the Proposed Development array area and potential area of impact from underwater noise during construction and decommissioning. There is therefore considered to be the potential for LSE on the Atlantic salmon feature of the site during the construction and decommissioning phases of the Proposed Development. As the lifecycle of the freshwater pearl mussel is dependent on Atlantic salmon, there may be an indirect impact upon this feature of the site and LSE on freshwater pearl mussel cannot be excluded. Noise levels will be substantially lower during the operation and maintenance phase and, as such, it is concluded that there is no potential for LSE on Annex II species that are qualifying features of the site during the operation and maintenance phase.

d: **Long-term habitat loss** - there is no direct physical overlap between the footprint of the Proposed Development and the SAC. It can therefore be concluded that there is no potential for LSE on any Annex II species that are qualifying features as a result of long-term habitat loss.

e: **EMF** – EMF emitted from subsea electrical cabling has the potential to interfere with the navigation of migratory fish. It is considered that there is potential for LSE on Atlantic salmon from EMF during the operation and maintenance phase. As the lifecycle of the freshwater pearl mussel is dependent on Atlantic salmon, there may be an indirect impact upon this feature of the site and LSE on freshwater pearl mussel also cannot be excluded.

f: **Colonisation of hard structures** – artificial structures placed on the seabed (i.e. foundations and scour/cable protection) are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity and potential changes in prey-predator interactions. It is considered that there is potential for LSE on Atlantic salmon from the colonisation of hard structures during the operation and maintenance phase. As the lifecycle of the freshwater pearl mussel is dependent on Atlantic salmon, there may be an indirect impact upon this feature of the site and LSE on freshwater pearl mussel cannot be excluded.

g: **Accidental pollution** – a good practice approach will be implemented as part of the Proposed Development via post-consent plans (e.g. a PEMMP) to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, irrespective of the possible effects on European sites. Following advice from NS (2021) and MSS (2021), accidental pollution associated with construction activities is not considered as an effect pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans. This rationale is taken to apply to all phases of the Proposed Development and the potential for LSE is discounted.

h: **In-combination effects** - Activities associated with planned projects or other activities in the vicinity of the Proposed Development have the potential to result in LSE to Annex II diadromous fish qualifying interest features of the site as a result of in-combination effects across all phases. Where potential for LSE has been concluded alone, the potential for LSE has been concluded in-combination.

Table 5.7: LSE Matrix for Annex II Diadromous Fish Species of the River Tay SAC

European Site Qualifying Interest Features	Temporary Habitat Loss/Disturbance			Increases in SSC and Sediment Deposition			Underwater Noise			Long-term Habitat Loss			EMF			Colonisation of Hard Structures			Accidental Pollution			In-combination effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Atlantic salmon (*Salmo salar*)	×a	×a	×a	×b	×b	×b	✓c	×c	✓c		×d			✓e			✓f		×g	×g	×g	✓h	✓h	✓h
Sea lamprey (*Petromyzon marinus*)	×a	×a	×a	×b	×b	×b	✓c	×c	✓c		×d			✓e			✓f		×g	×g	×g	✓h	✓h	✓h
River lamprey (*Lampetra fluviatilis*)	×a	×a	×a	×b	×b	×b	✓c	×c	✓c		×d			✓e			✓f		×g	×g	×g	✓h	✓h	✓h

a: **Temporary habitat loss/disturbance** – there is no potential for any direct physical overlap between the activities associated with all phases of the Proposed Development and the boundary of the European site. It can therefore be concluded that there is no potential for LSE on any Annex II diadromous fish qualifying interest features of the site from temporary habitat loss/disturbance.

b: **Increases in SSC and sediment deposition** - the extent of this impact, across all phases of the Proposed Development, will be spatially restricted to within the boundaries of the Proposed Development and the surrounding area (which will be refined through physical processes modelling to be undertaken for the EIA). Due to the distance between the Proposed Development and this site (82.8 km from the Proposed Development Array Area and 90.4 km from the ECC), it is concluded that there is no potential for LSE on any Annex II diadromous fish qualifying interest features of the site.

c: **Underwater noise** - there is potential for migratory species to be present within or transit through the Proposed Development array area and potential area of impact (injury or behavioural) from underwater noise during construction and decommissioning. There is therefore considered to be the potential for LSE on Annex II diadromous fish qualifying interest features of the site during the construction and decommissioning phases. Noise levels will be substantially lower during the operation and maintenance phase and, as such, it is concluded that there is no potential for LSE on any Annex II diadromous fish qualifying interest features of the site during the operation and maintenance phase.

d: **Long-term habitat loss** - there is no direct physical overlap between the footprint of the Proposed Development and the SAC. It can therefore be concluded that there is no potential for LSE on any Annex II diadromous fish qualifying interest features of the site from long-term habitat loss.

e: **EMF** – EMF emitted from subsea electrical cabling has the potential to interfere with the navigation of migratory fish. It is considered that there is potential for LSE on any Annex II diadromous fish qualifying interest features of the site from EMF during the operation and maintenance phase.

f: **Colonisation of hard structures** – artificial structures placed on the seabed (i.e. foundations and scour/cable protection) are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity and potential changes in prey-predator interactions. It is considered that there is potential for LSE on any Annex II diadromous fish qualifying interest features of the site from the colonisation of hard structures during the operation and maintenance phase.

g: **Accidental pollution** – a good practice approach will be implemented as part of the Proposed Development via post-consent plans (e.g. a PEMMP) to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, irrespective of the possible effects on European sites. Following advice from NS (2021) and MSS (2021), accidental pollution associated with construction activities is not considered as an effect pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans. This rationale is taken to apply to all phases of the Proposed Development and the potential for LSE is discounted

h: **In-combination effects** - Activities associated with planned projects or other activities in the vicinity of the Proposed Development have the potential to result in LSE to Annex II diadromous fish qualifying interest features of the site as a result of in-combination effects across all phases. Where potential for LSE has been concluded alone, the potential for LSE has been concluded in-combination.

Table 5.8: LSE Matrix for Annex II Qualifying Features of the River Dee SAC

European Site Qualifying Interest Features	Temporary Habitat Loss/Disturbance			Increases in SSC and Sediment Deposition			Underwater Noise			Long-term Habitat Loss			EMF			Colonisation of Hard Structures			Accidental Pollution			In-combination effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Atlantic salmon (*Salmo salar*)	×a	×a	×a	×b	×b	×b	✓c	×c	✓c		×d			✓e			✓f		×g	×g	×g	✓h	✓h	✓h
Freshwater pearl mussel (*Margaritifera margaritifera*)	×a	×a	×a	×b	×b	×b	✓c	×c	✓c		×d			✓e			✓f		×g	×g	×g	✓h	✓h	✓h

a: **Temporary habitat loss/disturbance** – there is no potential for any direct physical overlap between the activities associated with all phases of the Proposed Development and the boundary of the European site. It can therefore be concluded that there is no potential for LSE on any Annex II species that are qualifying features of the site as a result of temporary habitat loss/disturbance.

b: **Increases in SSC and sediment deposition** - the extent of this impact, across all phases of the Proposed Development will be spatially restricted to within the boundaries of the Proposed Development and the surrounding area (which will be refined through physical processes modelling to be undertaken for the EIA). Due to the distance between the Proposed Development and this site (74.5 km from the Proposed Development Array Area and 114.5 km from the ECC), it is concluded that there is no potential for LSE on any Annex II species that are qualifying features of the site.

c: **Underwater noise** - there is potential for Atlantic salmon smolts and/or adults to be present within or transit through the Proposed Development array area and potential area of impact from underwater noise during construction and decommissioning of the Proposed Development. There is therefore considered to be the potential for LSE on the Atlantic salmon feature of the site during the construction and decommissioning phases. As the lifecycle of the freshwater pearl mussel is dependent on Atlantic salmon, there may be an indirect impact upon this feature of the site and LSE on freshwater pearl mussel cannot be excluded. Noise levels will be substantially lower during the operation and maintenance phase and, as such, it is concluded that there is no potential for LSE on Annex II species that are qualifying features of the site during the operation and maintenance phase.

d: **Long-term habitat loss** – there is no direct physical overlap between the footprint of the Proposed Development and the SAC. It can therefore be concluded that there is no potential for LSE on any Annex II species that are qualifying features of the site from long-term habitat loss.

e: **EMF** – EMF emitted from subsea electrical cabling has the potential to interfere with the navigation of migratory fish. It is considered that there is potential for LSE on Atlantic salmon from EMF during the operation and maintenance phase. As the lifecycle of the freshwater pearl mussel is dependent on Atlantic salmon, there may be an indirect impact upon this feature of the site and LSE on freshwater pearl mussel also cannot be excluded.

f: **Colonisation of hard structures** – artificial structures placed on the seabed (i.e. foundations and scour/cable protection) are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity and potential changes in prey-predator interactions. It is considered that there is potential for LSE on Atlantic salmon from the colonisation of hard structures during the operation and maintenance phase. As the lifecycle of the freshwater pearl mussel is dependent on Atlantic salmon, there may be an indirect impact upon this feature of the site and LSE on freshwater pearl mussel also cannot be excluded.

g: **Accidental pollution** – a good practice approach will be implemented as part of the Proposed Development via post-consent plans (e.g. a PEMMP) to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, irrespective of the possible effects on European sites. Following advice from NS (2021) and MSS (2021), accidental pollution associated with construction activities is not considered as an effect pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans. This rationale is taken to apply to all phases of the Proposed Development and the potential for LSE is discounted.

h: **In-combination effects** - Activities associated with planned projects or other activities in the vicinity of the Proposed Development have the potential to result in LSE to Annex II diadromous fish qualifying interest features of the site as a result of in-combination effects across all phases. Where potential for LSE has been concluded alone, the potential for LSE has been concluded in-combination.

Table 5.9: LSE Matrix for Annex II Diadromous Fish Species of the River Teith SAC

European Site Qualifying Interest Features	Temporary Habitat Loss/Disturbance			Increases in SSC and Sediment Deposition			Underwater Noise			Long-term Habitat Loss			EMF			Colonisation of Hard Structures			Accidental Pollution			In-combination effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Atlantic salmon (*Salmo salar*)	×a	×a	×a	×b	×b	×b	✓c	×c	✓c		×d			✓e			✓f		×g	×g	×g	✓h	✓h	✓h
Sea lamprey (*Petromyzon marinus*)	×a	×a	×a	×b	×b	×b	✓c	×c	✓c		×d			✓e			✓f		×g	×g	×g	✓h	✓h	✓h
River lamprey (*Lampetra fluviatilis*)	×a	×a	×a	×b	×b	×b	✓c	×c	✓c		×d			✓e			✓f		×g	×g	×g	✓h	✓h	✓h

a: **Temporary habitat loss/disturbance** – there is no potential for any direct physical overlap between the activities associated with all phases of the Proposed Development and the boundary of the European site. It can therefore be concluded that there is no potential for LSE on any Annex II species that are qualifying features of the site as a result of temporary habitat loss/disturbance.

b: **Increases in SSC and sediment deposition** - the extent of this impact, across all phases of the Proposed Development, will be spatially restricted to within the boundaries of the Proposed Development and the surrounding area (which will be refined through physical processes modelling to be undertaken for the EIA). Due to the distance between the Proposed Development and this site (137.2 km from the Proposed Development Array Area and 103.9 km from the ECC), it is concluded that there is no potential for LSE on any Annex II species that are qualifying features of the site during any phase of the Proposed Development.

c: **Underwater noise** - there is potential for migratory species to be present within or transit through the Proposed Development array area and potential area of impact from underwater noise during construction and decommissioning of the Proposed Development. There is therefore considered to be the potential for LSE on Annex II diadromous fish qualifying interest features of the site during the construction and decommissioning phases. Noise levels will be substantially lower during the operation and maintenance phase and, as such, it is concluded that there is no potential for LSE on any Annex II species that are qualifying features of the site during the operation and maintenance phase.

d: **Long-term habitat loss** - there is no direct physical overlap between the footprint of the Proposed Development and the SAC. It can therefore be concluded that there is no potential for LSE on any Annex II species that are qualifying features of the site from long-term habitat loss.

e: **EMF** – EMF emitted from subsea electrical cabling has the potential to interfere with the navigation of migratory fish. It is considered that there is potential for LSE on any Annex II species that are qualifying features of the site from EMF during the operation and maintenance phase.

f: **Colonisation of hard structures** – artificial structures placed on the seabed (i.e. foundations and scour/cable protection) are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity and potential changes in prey-predator interactions. It is considered that there is potential for LSE on any Annex II species that are qualifying features of the site from the colonisation of hard structures during the operation and maintenance phase.

g: **Accidental pollution** – a good practice approach will be implemented as part of the Proposed Development via post-consent plans (e.g. a PEMMP) to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, irrespective of the possible effects on European sites. Following advice from NS (2021) and MSS (2021), accidental pollution associated with construction activities is not considered as an effect pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans. This rationale is taken to apply to all phases of the Proposed Development and the potential for LSE is discounted.

h: **In-combination effects -** Activities associated with planned projects or other activities in the vicinity of the Proposed Development have the potential to result in LSE to Annex II diadromous fish qualifying interest features of the site as a result of in-combination effects across all phases. Where potential for LSE has been concluded alone, the potential for LSE has been concluded in-combination.

5.4. ASSESSMENT OF LSE FOR ANNEX II MARINE MAMMALS

214. A total of 24 European sites were identified in the initial screening process (section 4.3) to be taken forward for determination of LSE for Annex II marine mammals. These sites are listed below, broken down by country:

- five sites in the United Kingdom
  - Berwickshire and North Northumberland Coast SAC;
  - Isle of May SAC;
  - Firth of Tay and Eden Estuary SAC;
  - Southern North Sea SAC; and
  - Moray Firth SAC.
- 11 sites in Germany (see Table 4.3);
- five sites in Denmark (see Table 4.3);
- two sites in the Netherlands (see Table 4.3); and
- one site in Sweden (see Table 4.3).

5.4.2. SITE OVERVIEWS

215. The following sections provide a brief overview of each of the UK sites brought forward for consideration of LSE and a summary of their designated features. The Natura 2000 standard data forms are provided in Appendix 1 for all sites. This includes sites within other European Economic Area (EEA) states for which a potential transboundary impact has been identified. These sites are not therefore summarised in detail below.

Berwickshire and North Northumberland Coast SAC

216. The Berwickshire and North Northumberland Coast SAC is located approximately 30.1 km from the Proposed Development array area and 3.0 km from the proposed ECC (see Figure 4.3). The site is designated for grey seal, and the site supports approximately 3% of the British annual pup production of this species. Breeding, hauling out and moulting occurs on habitats above the Highest Astronomical Tide (HAT) in areas such as Staple Island within the Farne Islands. A large number of seals also haul out around Holy Island sands, Lindisfarne (Natural England and NatureScot, 2021).

Isle of May SAC

217. The Isle of May SAC lies at the entrance to the Firth of Forth, approximately 38.5 km from the Proposed Development array area and 20.9 km from the proposed ECC (see Figure 4.3). The site supports a breeding colony of grey seals and is the largest east coast breeding colony of grey seals in Scotland and the fourth-largest breeding colony in the UK, contributing approximately 4.5% of annual UK pup production (JNCC, 2020g).

Firth of Tay and Eden Estuary SAC

218. The Firth of Tay and Eden Estuary SAC is located approximately 42.5 km from the Proposed Development array area and 51.7 km from the proposed ECC (see Figure 4.3). The site is designated for harbour seal and supports a nationally important breeding colony of harbour seal, part of the east coast population of harbour seals that typically utilise sandbanks. Around 600 adults haul out at the site to rest, pup and moult, representing around 2% of the UK population of this species (JNCC, 2020h).

Southern North Sea SAC

219. The Southern North Sea SAC is located approximately 144 km from the Proposed Development array area and 151 km from the proposed ECC (see Figure 4.3) and is an area of importance for harbour porpoise. The site includes key winter and summer habitat for this species and supports an estimated 17.5% of the UK North Sea Management Unit (MU) population for harbour porpoise. Approximately two-thirds of the site, the northern part, is recognised as important for harbour porpoise during the summer season, whilst the southern part supports persistently higher densities during the winter (JNCC, 2017).

Moray Firth SAC

220. The Moray Firth SAC in north-east Scotland is located approximately 224 km from the Proposed Development array area and 151 km from the proposed ECC (see Figure 4.3). The site supports the only known resident population of bottlenose dolphin in the North Sea. The population is estimated to be around 195 individuals (Cheney *et al.,* 1999). Bottlenose dolphins are present all year round, and while they range widely in the Moray Firth, they appear to favour particular areas (JNCC, 2020i).

5.4.3. PATHWAYS FOR LSE: POTENTIAL IMPACTS ON MARINE MAMMALS

221. A list of potential impacts and effects on marine mammals that may result from the Proposed Development has been provided below (section 5.4.3 - Construction Phase to Decommissioning Phase). These are the impacts which must be taken into account when determining the potential for LSE on the designated sites and marine mammal qualifying interest features identified in section 4.3. The list of potential impacts on marine mammals has been compiled using the experience and knowledge gained from previous offshore wind farm projects and Natural England's 'advice on operations' (Natural England and NatureScot, 2021; JNCC and Natural England, 2019) and the pressures data available on Scotland's environment web (https://www.environment.gov.scot/) for individual features of sites. The list of potential impacts has also been informed by the SNCBs responses to the Initial Berwick Bank Wind Farm Proposal LSE Screening Report (see Table 1.1). Consideration of the potential impacts identified for Annex II marine mammals is presented in the following sections to inform the determination of LSE in section 5.4.3.

Construction Phase

<u>Underwater Noise from Piling</u>

222. Impact piling during construction may result in hearing damage/auditory injury (permanent threshold shift (PTS)) or behavioural disturbance/displacement of marine mammals.

Harbour Porpoise

223. Harbour porpoise were the most regularly sighted marine mammal species (2,049 sightings) during the 25 months of site-specific aerial surveys that were undertaken to inform the EIA for the Proposed Development, with sightings throughout the survey area. There were sightings of harbour porpoise in every month and sightings were considerably higher in April/May of both years (2020 and 2021) when compared to other months and generally sightings were lower later in the autumn and winter. The mean corrected density estimate across all monthly surveys for the aerial survey area was estimated as 0.24 animals

per km^2 (lower 95% confidence limit ©L: 0.063; upper 95% CL: 0.472). These findings are consistent with the results of other studies in the area including previous surveys in the Firth of Forth Round 3 Zone (Grellier and Lacey, 2012). The SCANS III density estimate for the block coinciding with the Proposed Development (Block R) is 0.599 harbour porpoise per km^2 (CV 0.29; Hammond *et al.,* 2017). The density estimates for harbour porpoise within the outer Forth and Tay region are predicted to be relatively low compared to other parts of the North Sea (Heinänen and Skov, 2015).

224. There is considered to be the potential for harbour porpoise from the Southern North Sea SAC to be present (e.g. foraging) within the Proposed Development and the potential zone of influence from underwater noise during piling. On this basis, there is considered to be the potential for LSE from construction noise on the Southern North Sea SAC. All other European sites with harbour porpoise as features are located more than 292 km from the Proposed Development and so a significant effect occurring to features of these sites is considered highly unlikely and all other European sites for harbour porpoise are screened out.

Bottlenose Dolphin

225. The Moray Firth population of bottlenose dolphins is the only known resident population of this species in the North Sea. The current population estimate of bottlenose dolphin abundance for the Coastal East Scotland MU population (within which the Moray Firth SAC lies) is 189 individuals (95% confidence interval (CI): 155 – 216) based on photo-ID counts between 2006 and 2007 (IAMMWG, 2021). It has been estimated that, on average, 52.5% of the bottlenose dolphin population use the waters of St Andrews Bay and the Tay estuary, with the entrance to the Firth of Tay and waters around Montrose shown to be consistently high use areas (Arso Civil *et al.,* 2019). Only two sightings of bottlenose dolphin were made during the two years of site-specific aerial surveys undertaken to inform the EIA for the Proposed Development (one animal in October 2019 and six individuals in the same single sighting in April 2021). The SCANS III density estimate for the block coinciding with the Proposed Development (Block R) is 0.0298 bottlenose dolphin per km^2 (CV 0.861; Hammond *et al.,* 2017).

226. Bottlenose dolphin are mid-frequency cetaceans and so the disturbance ranges for this species from construction noise are likely to be less than those for harbour porpoise (a high frequency cetacean). The Moray Firth bottlenose dolphin population predominantly occurs in coastal areas (SSE, 2012). There is, however, considered to be the potential for bottlenose dolphin features of the Moray Firth SAC to be transiting through, or foraging in, the Proposed Development and zone of influence (i.e. injury or disturbance) from underwater noise. On this basis, there is considered to be the potential for LSE from construction noise on the bottlenose dolphin feature of the Moray Firth SAC.

Harbour Seal

227. Results of tracking studies have shown clear evidence of avoidance of offshore wind farms by harbour seals during pile driving, at ranges up to 25 km from piling sites. The same studies have also shown that avoidance behaviour is temporary and restricted to periods of active pile driving with seal distribution returning to pre-piling levels within two hours of the cessation of piling (Russel *et al.,* 2016; SCOS, 2018). This evidence suggests harbour seal exhibit a short-term response to pile driving activity.

228. No harbour seals were sighted during the two years of site-specific aerial surveys undertaken to inform the EIA for the Proposed Development. There were however, 466 sightings categorised as 'seal species', some of which may have been harbour seals. SMRU predicted at-sea usage in the Proposed Development array area of 0.004 seals per km^2 (see Figure 5.1). A study commissioned by the Forth and Tay Offshore Wind Developers Group (FTOWDG) presented analysis of telemetry data available from harbour seals tagged by SMRU in the East Scotland SMA between 2001 and 2008 (see Appendix 2). The analysis demonstrated that harbour seal movements are mostly coastal with little overlap with the Proposed Development (see Appendix 2). As discussed previously in section 4.3, the telemetry data does however, indicate connectivity between the Proposed Development and the Firth of Tay and Eden Estuary SAC (see Appendix 2).

229. As discussed in section 4.3, there is considered to be potential for harbour seals to forage at distances of up to 100 km from haul out sites, and on this basis, there is considered to be the potential for LSE from construction noise on European sites within this distance (i.e. Firth of Tay and Eden Estuary SAC).

Grey Seal

230. The results of a behavioural study (Aarts *et al.,* 2018) which tracked grey seals during the construction of a wind farm in Dutch waters, have shown that grey seals display a diverse range of responses to pile driving, including: no behavioural change, altered surfacing and diving behaviour suggesting a transition from foraging behaviour to more horizontal movement, changes in swim direction away from the source, heading inshore, swimming perpendicular to the incoming sound, and stopping. Behavioural changes were on average greater and occurred more frequently at smaller distances (< 30 km) from the piling activity, however grey seals exposed to pile driving, even at close distances (< 30 km), returned to the same area on subsequent trips (Kirkwood *et al.,* 2015; Aarts *et al.,* 2018).

231. A total of 186 grey seals were sighted during the two years of site-specific aerial surveys undertaken to inform the EIA for the Proposed Development. In addition, there were 466 sightings categorised as 'seal species' which, given the at-sea usage data for the Proposed Development which suggests a maximum density of 1.896 seals per km^2 (see Figure 5.1), the majority of these are expected to be grey seals. Telemetry data for grey seals tagged along the east coast of the UK show a large amount of overlap with grey seal movements and the Proposed Development (see Appendix 2). The telemetry data also suggest potential connectivity with the Isle of May SAC and the Berwickshire and North Northumberland Coast SAC (see Appendix 2).

232. As discussed in section 4.3, there is considered to be potential for grey seal to forage distances of up to 100 km and, on this basis, there is considered to be the potential for LSE from construction noise (piling) on European sites within this range (i.e. Berwickshire and North Northumberland Coast SAC and Isle of May SAC).

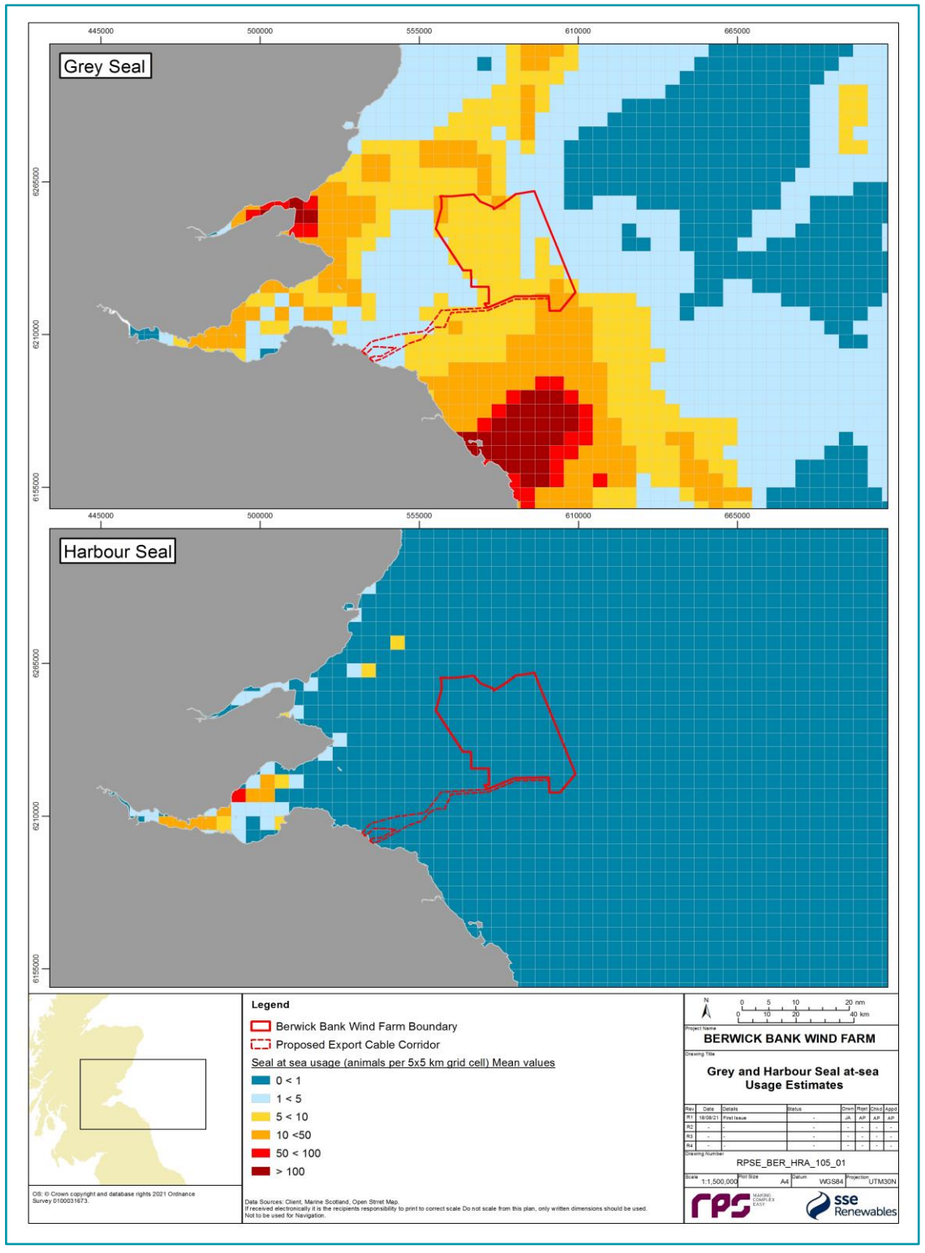


Figure 5.1: Grey (top) and Harbour (bottom) Seal At-sea Usage Estimates

Underwater Noise from Clearance of Unexploded Ordnance (UXO)

233. There may be a requirement for the clearance of UXOs from the Proposed Development which will be implemented via low order deflagration. The detonation of small charges as part of this process has the potential to result in hearing damage/auditory injury (permanent threshold shift (PTS)) or behavioural disturbance/displacement of marine mammals.

Harbour Porpoise

234. As outlined in paragraphs 223 and 224, there is considered to be the potential for harbour porpoise from the Southern North Sea SAC to be present (e.g. foraging) within the Proposed Development and the potential zone of influence from underwater noise generated during UXO clearance activities. On this basis, there is considered to be the potential for LSE on the Southern North Sea SAC. All other European sites with harbour porpoise as features are located more than 292 km from the Proposed Development and so a significant effect occurring to features of these sites is considered highly unlikely and all other European sites for harbour porpoise are screened out.

Bottlenose Dolphin

235. As outlined in paragraphs 225 and 226, there is considered to be the potential for bottlenose dolphin features of the Moray Firth SAC to be transiting through, or foraging in, the Proposed Development and zone of influence (i.e. injury or disturbance) from underwater noise generated during UXO clearance activities. On this basis, there is considered to be the potential for LSE from construction noise on the bottlenose dolphin feature of the Moray Firth SAC.

Harbour Seal

236. As outlined in paragraphs 227 to 229, no harbour seals were sighted during the two years of site-specific aerial surveys but telemetry data does indicate potential for connectivity between the Proposed Development and the Firth of Tay and Eden Estuary SAC. There is considered to be potential for harbour seals to forage at distances of up to 100 km from haul out sites, and on this basis, there is considered to be the potential for LSE from underwater noise generated during UXO clearance on European sites within this distance (i.e. Firth of Tay and Eden Estuary SAC).

Grey Seal

237. As outlined in paragraphs 230 to 232, there is considered to be potential for grey seal to forage distances of up to 100 km and, on this basis, there is considered to be the potential for LSE from underwater noise generated during UXO clearance on European sites within this range (i.e. Berwickshire and North Northumberland Coast SAC and Isle of May SAC).

Underwater Noise from Pre-construction Surveys

238. The impact of pre-construction related activities, and in particular geophysical surveys, may result in behavioural disturbance/displacement of marine mammals.

Harbour Porpoise

239. As outlined in paragraphs 223 and 224, there is considered to be the potential for harbour porpoise from the Southern North Sea SAC to be present (e.g. foraging) within the Proposed Development and the potential zone of influence from underwater noise generated during pre-construction surveys including geophysical surveys. On this basis, there is considered to be the potential for LSE on the Southern North Sea SAC. All other European sites with harbour porpoise as features are located more than 292 km from

the Proposed Development and so a significant effect occurring to features of these sites is considered highly unlikely and all other European sites for harbour porpoise are screened out.

Bottlenose Dolphin

240. As outlined in paragraphs 225 and 226, there is considered to be the potential for bottlenose dolphin features of the Moray Firth SAC to be transiting through, or foraging in, the Proposed Development and zone of influence (i.e. injury or disturbance) from underwater noise generated during pre-construction surveys including geophysical surveys. On this basis, there is considered to be the potential for LSE from pre-construction surveys including geophysical surveys on the bottlenose dolphin feature of the Moray Firth SAC.

Harbour Seal

241. As outlined in paragraphs 227 to 229, no harbour seals were sighted during the two years of site-specific aerial surveys but telemetry data does indicate potential for connectivity between the Proposed Development and the Firth of Tay and Eden Estuary SAC. There is considered to be potential for harbour seals to forage at distances of up to 100 km from haul out sites, and on this basis, there is considered to be the potential for LSE from underwater noise generated during pre-construction surveys including geophysical surveys on European sites within this distance (i.e. Firth of Tay and Eden Estuary SAC).

Grey Seal

242. As outlined in paragraphs 230 to 232, there is considered to be potential for grey seal to forage distances of up to 100 km and, on this basis, there is considered to be the potential for LSE from underwater noise generated during pre-construction surveys including geophysical surveys on European sites within this range (i.e. Berwickshire and North Northumberland Coast SAC and Isle of May SAC).

<u>Underwater Noise from Vessels and Other Vessel Activities</u>

243. Disturbance of marine mammals may also arise during the construction phase from vessel use and other construction related activities (e.g. dredging, trenching, rock placement). The extent of this potential disturbance will be spatially restricted to within the boundaries of the Proposed Development and along vessel routes to ports used in support of the Proposed Development during the construction phase. Beyond this, the movements of vessels using already established vessel routes will be dispersed and will become part of the background vessel traffic.

Harbour Porpoise

244. Given the distance of the nearest European site for harbour porpoise from the Proposed Development (146 km for the Southern North Sea SAC), together with the fact that the uplift in vessel traffic will be small compared with existing baseline levels and that other construction related activities such as dredging, trenching or placement of rock protection will be intermittent and short term, it is not considered that vessel traffic associated with the construction of the Proposed Development will result in significant disturbance to harbour porpoise and so this impact is screened out of further consideration for this species.

Bottlenose Dolphin

245. There were only two sightings of bottlenose dolphins during the recent aerial surveys for the Proposed Development. This species is mainly encountered in inshore areas and therefore vessel noise during construction is unlikely to lead to LSE on the species. Any disturbance associated with activities near shore along the export cable route would be short term and as described above the baseline suggests that bottlenose dolphin is unlikely to occur along this part of the coast. Given the distance of the Moray Firth SAC from the Proposed Development (224 km to the array area), it is considered that the increase in vessel traffic and other activities (e.g. dredging, trenching, rock placement) associated with the construction of the Proposed Development will not result in significant disturbance to bottlenose dolphin and so this impact is screened out of further consideration for this species.

Harbour Seal

246. As discussed previously for underwater noise from piling, the usage of the Proposed Development by harbour seal is predicted to be low and there are no haul out sites near either landfall option which could be disturbed by construction activities along the proposed ECC. The nearest harbour seal haul out sites are located in the Firth of Forth, more than 20 km away (SCOS, 2020).

247. Although the location of ports to be used in support of the Proposed Development is not currently confirmed, it is likely that the majority of vessel movements will be to/from local ports on the east coast of Scotland and should any ports be located within the Firth of Tay then there is the potential for interaction between harbour seals using the Firth of Tay. There is also the potential for other construction related activities (e.g. dredging, trenching, rock placement) to interact with seals using the Firth of Tay. There is therefore the potential for vessel movements and other vessel activities to result in disturbance to the harbour seal feature of the Firth of Tay and Eden Estuary SAC.

Grey Seal

248. Site-specific surveys as well as desktop data sources (i.e. telemetry data and at sea usage data) all indicate an overlap of grey seal movements and the Proposed Development. Telemetry data also show potential connectivity with the two European sites screened into the assessment of LSE, Isle of May SAC and the Berwickshire and North Northumberland Coast SAC (see Appendix 2 and Figure 5.1). It is therefore considered that there is the potential for vessel movements and other vessel-related activities (e.g. dredging, trenching, rock placement) associated with the construction of the Proposed Development to result in disturbance to grey seal.

249. The closest seasonal haul out for grey seal is Fast Castle, which partially overlaps with the Berwickshire and North Northumberland SAC and is located within 2 km of the Thorntonloch Landfall, and ~5.5 km from the Skateraw Landfall (Figure 5.2). Given the distance (some 3 km to the south of the proposed landfall locations/cable route), it is unlikely that construction works at the landfall or activities associated with cable installation are likely to affect any individual hauled out using this site. On this basis, there is considered to be the potential for LSE from vessel noise and other vessel-related construction activities for grey seals at sea only (i.e. not when hauled out) from the Isle of May SAC and the Berwickshire and North Northumberland Coast SAC.

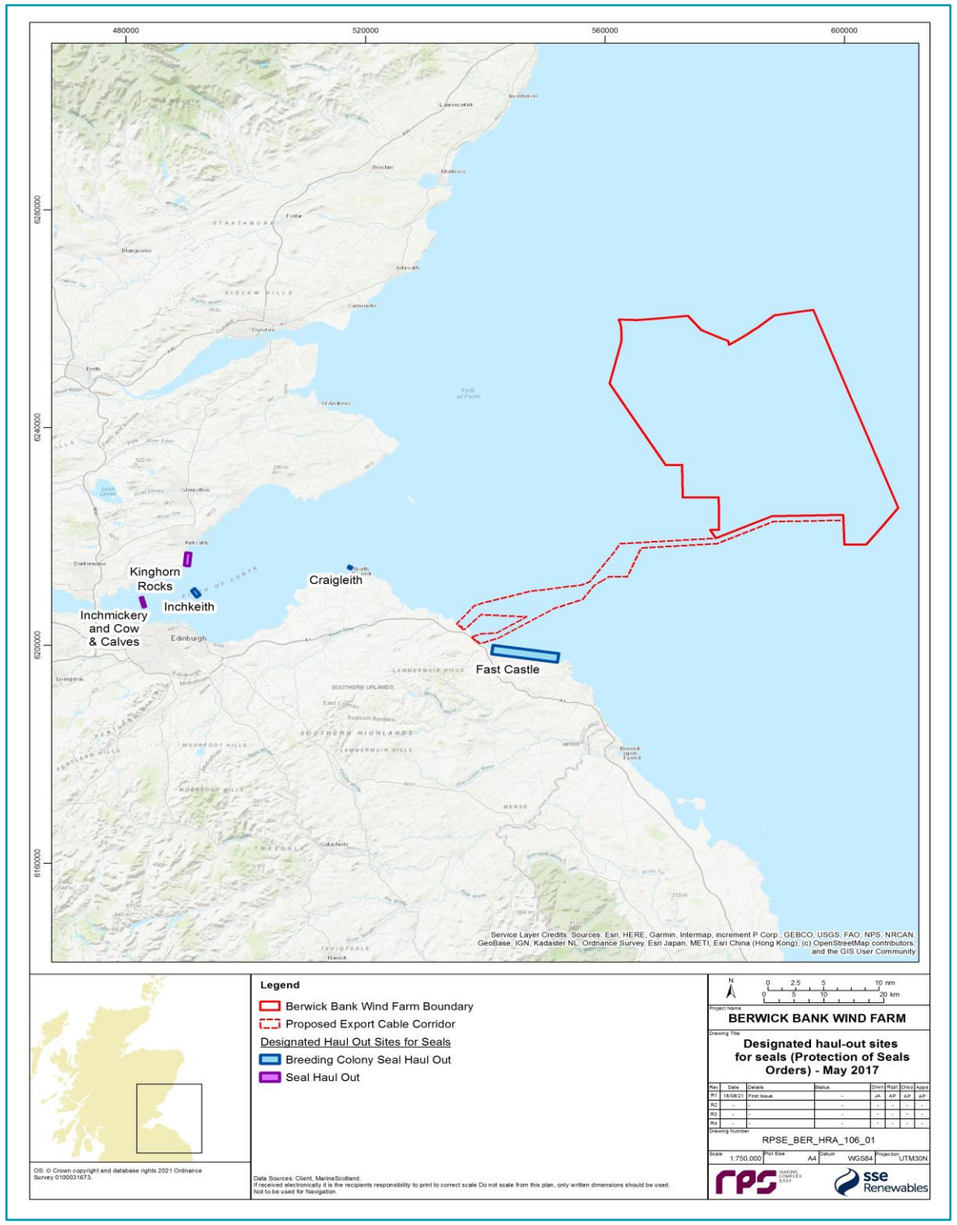


Figure 5.2: Designated Haul Out Sites for Grey and Harbour Seal in the East Scotland Seal Management Area

Vessel Collision Risk

250. An increase in vessel activity, compared to baseline levels, during the construction phase, may result in increased vessel collisions with marine mammals. The extent of this potential disturbance will be spatially restricted to within the boundaries of the Proposed Development and along routes to local ports. Beyond this, the movements of vessels using already established vessel routes will be dispersed and will become part of the background vessel traffic.

Harbour Porpoise

251. The construction of the Proposed Development is likely to result in a relatively small increase in vessel traffic compared to current background levels. Two of the key factors that determine the risk of a collision are the presence of marine mammals and vessels in the same area and whether those animals are exposed to vessels on a regulator basis (see Schoeman *et al*., 2020). As there is only a small increase in vessels against a baseline of high shipping activity, the likelihood of collisions occurring between vessels and marine mammals is considered to be low, with marine mammals likely to maintain their distance. There is therefore considered to be little potential for the increased vessel activity during construction to result in a significant impact to harbour porpoise in terms of collision risk with vessels. As such, no LSEs are anticipated to occur to harbour porpoise qualifying features of any European site and the impact of vessel collision risk is therefore screened out of further consideration for harbour porpoise.

Bottlenose Dolphin

252. As discussed for harbour porpoise above, the increase in vessel traffic associated with the construction of the Proposed Development is likely to be low compared to background levels and likelihood of the impact occurring is considered to be low and there is therefore considered to be little potential for the increased vessel activity during construction to result in a significant impact to bottlenose dolphin in terms of collision risk with vessels. As such, no LSEs are anticipated to occur to bottlenose dolphin qualifying features of any European site and the impact of vessel collision risk is therefore screened out of further consideration for bottlenose dolphin.

Harbour Seal

253. As discussed previously for underwater noise from piling, the usage of the Proposed Development by harbour seal is predicted to be low and there are no haul out sites within 40 km of either landfall option. As discussed for harbour porpoise, the increase in vessel traffic associated with the construction of the Proposed Development is likely to be low compared to background levels and likelihood of the impact occurring is considered to be low and there is therefore considered to be little potential for the increased vessel activity during construction to result in a significant impact to harbour seal in terms of collision risk with vessels. As such, no LSEs are anticipated to occur to harbour seal qualifying features of any European site and the impact of vessel collision risk is therefore screened out of further consideration for harbour seal.

Grey Seal

254. As discussed previously, site-specific and desktop data sources indicate an overlap between grey seal movements and the Proposed Development as well as connectivity with the two European sites screened into the assessment of LSE (Isle of May SAC and the Berwickshire and North Northumberland Coast SAC). There are also grey seal haul outs, associated with the Berwickshire and North Northumberland Coast SAC in close proximity to the landfall options. The majority of vessels associated with construction of the Proposed Development will, however, be slow moving or stationary within the Proposed Development

array area. Further, as only seals at the surface would be suspectable to vessel strike and given the limited number of vessels operating at any one time, not all grey seals in the Proposed Development array area would be simultaneously at risk of collision. The Advice on Operations for the SACs screened in (e.g. Natural England and NatureScot, 2021) identify collision risk for grey seal, however the text draws on the risk of corkscrew injuries from vessels which is no longer considered to be an impact associated with vessel movements (Brownlow *et al.,* 2016; Bishop *et al.,* 2016). The Advice on Operations acknowledges that in general instances of injury or mortality of grey seals caused by vessels remains a very rare occurrence in UK waters (Natural England and NatureScot, 2021).

255. The increase in vessel traffic associated with the construction of the Proposed Development is likely to be low compared to background levels and likelihood of the impact occurring is considered to be low and there is therefore considered to be little potential for the increased vessel activity during construction to result in a significant impact to grey seal in terms of collision risk with vessels. As such, no LSEs are anticipated to occur to grey seal qualifying features of any European site and the impact of vessel collision risk is therefore screened out of further consideration for grey seal.

Changes in Prey Availability

256. There is the potential for changes in marine mammal prey abundance and distribution to arise as a result of construction activities which physically disturb the seabed, result in increased SSC or which generate underwater noise. Potential impacts to prey species may result in changes in the ability/success of marine mammals to forage in the area of the Proposed Development. Key prey species for marine mammals include clupeids (e.g. herring), gadoids (e.g., cod, whiting), sandeels and flatfish. These species are important components of the fish community in the vicinity of the Proposed Development (SSE, 2020b).

Harbour Porpoise

257. The widest ranging effect on prey species is likely to be underwater noise during construction. Harbour porpoise have a large foraging range and any impact to the fish community in the vicinity of the Proposed Development will be of short-term duration and temporary in nature. The effect of underwater noise on prey species can however only be fully assessed using the results of project-specific underwater noise modelling which will be undertaken for the EIA. Until these results are available, this impact cannot be screened out for harbour porpoise.

Bottlenose Dolphin

258. St Andrews Bay and the Tay estuary are consistently used by approximately half of the estimated Moray Firth SAC bottlenose dolphin population during the summer, but bottlenose dolphin presence in this area is focused on the entrance to the Firth of Tay and waters around Montrose (Arso Civil *et al.,* 2019). The Moray Firth bottlenose dolphin population predominantly occurs in coastal areas (SSE, 2012) and therefore, any potential temporary changes to the fish community in the vicinity of the Proposed Development array area as a result of construction impacts such as underwater noise, are unlikely to result in significant effects to bottlenose dolphin given the potential for foraging opportunities in the wider area. The effect of underwater noise on prey species can however only be fully assessed using the result of project-specific underwater noise modelling which will be undertaken for the EIA. Until these results are available, this impact cannot be screened out for further consideration for bottlenose dolphin.

Harbour Seal

259. As discussed previously, and shown in Figure 5.1, harbour seal usage of the Proposed Development is predicted to be low and the area is considered unlikely to be an important foraging area for this species. Whilst effects on fish populations from underwater noise, SSC and habitat disturbance are likely to be temporary, localised, short-term and therefore not significant, the effect of underwater noise on prey species will be assessed using the result of project-specific underwater noise modelling which will be undertaken for the EIA. Until these results are available, this impact cannot be screened out for harbour seal.

Grey Seal

260. The Proposed Development is likely to overlap with foraging grounds for grey seal (see Figure 5.1 and Appendix 2) from both the Berwickshire and North Northumberland Coast SAC and the Isle of May SAC. Effects on fish populations from underwater noise, SSC and habitat disturbance are likely to be temporary, localised, short-term and therefore not significant. The effect of underwater noise on prey species will, however, be assessed using the result of project-specific underwater noise modelling which will be undertaken for the EIA. Until these results are available, this impact cannot be screened out for grey seal.

Changes in Water Clarity

261. Sediment disturbance arising from construction activities (e.g. foundation and cable installation, and seabed preparation works) may result in temporary increases in SSC which can directly impact the foraging ability of marine mammals. Indirect effects may also occur as a result of impacts to prey species from SSC (these are considered under 'changes to prey availability' above). The extent of this impact will be spatially restricted to within the boundaries of the Proposed Development and the surrounding area (which will be refined through physical processes modelling to be undertaken for the EIA).

Harbour Porpoise

262. Harbour porpoise are well known to forage in tidal areas where water conditions are turbid and visibility conditions poor. For example, harbour porpoise in the UK have been documented foraging in areas with high tidal flows (e.g. Pierpoint 2008; Marubini *et al.,* 2009); therefore, low light levels, turbid waters and suspended sediments are unlikely to adversely impact harbour porpoise foraging success. When the visual sensory systems of odontocetes are compromised, they are able to sense the environment in other ways, primarily using echolocation to navigate and find food in darkness for example. There is likely to be large natural variability in the SSC within the Proposed Development Marine Mammal Study Area due the proximity to the Firth of Forth estuary, so marine mammals living here are likely to be tolerant of any small scale increases, such as those associated with the construction activities. This impact is therefore screened out of further consideration for harbour porpoise.

Bottlenose Dolphin

263. As above for harbour porpoise, bottlenose dolphins are adapted to, and tolerant of, turbid environments. The localised and short-term nature of increases in SSC during the construction phase are unlikely to result in a significant effect on the foraging ability of this species. This impact is therefore screened out of further consideration for bottlenose dolphin.

Harbour Seal

264. Harbour seal are well known to forage in turbid waters with poor visibility and, in the UK, have been documented foraging in areas with high tidal flows (e.g. Hastie *et al.,* 2016). Low light levels, turbid waters and suspended sediments are unlikely to adversely impact harbour seal foraging success. When the visual sensory systems of harbour seal are compromised, they are able to detect water movements and hydrodynamic trails with their mystacial vibrissae. Any localised and short-term increases in SSC are considered unlikely to result in significant effects on the foraging ability of harbour seal and therefore this impact is screened out of further consideration for this species.

Grey Seal

265. Grey seal frequently occur in turbid environments and are adapted to navigating and locating prey in such conditions (Todd *et al.,* 2014). The temporary increases in SSC that may arise during the construction and decommissioning phases will be localised, short-term and intermittent and unlikely to result in significant effects to the foraging ability of grey seal. This impact is therefore screened out of further consideration for grey seal.

Accidental Pollution

All Species

266. There is the potential for pollution to be accidentally released during the construction phase of the Proposed Development from vessels/vehicles and equipment/machinery. The risk of such events occurring will be managed by the implementation of measures set out in standard post consent plans (e.g. a PEMMP including a Marine Pollution Contingency Plan) which will be implemented as part of the Proposed Development. These plans will include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. These plans will also set out industry good practice and OSPAR, IMO and MARPOL guidelines for preventing pollution at sea. With reference to these plans, a significant impact within the extent of the Proposed Development is considered very unlikely to occur, and a major incident that may impact any species at a population level is considered very unlikely. Furthermore, in their response to the LSE Screening Report for the initial Berwick Bank Wind Farm Proposal, MSS and MS-LOT recommended that this impact could be screened out. On this basis, accidental pollution is screened out of further consideration for all species, across all phases of the Proposed Development.

Operation and Maintenance Phase

Underwater Noise from Vessels and Other Vessel Activities

267. Disturbance of marine mammals may arise during the operation and maintenance phase from increased vessel traffic and vessel-based activities (e.g. cable reburial etc.) associated with operation and maintenance activities. As during the construction phase, the extent of this potential disturbance will be spatially restricted to within the boundaries of the Proposed Development and along routes to local ports. Beyond this, the movements of vessels using already established vessel routes will be dispersed and will become part of the background vessel traffic.

Harbour Porpoise

268. The nearest SAC for harbour porpoise (Southern North Sea SAC) is located 146 km to the south of the Proposed Development array area. The operation and maintenance port location for the Proposed Development is not confirmed at this stage but it is likely that the majority of vessel movements will be to/from the east coast of Scotland. It is considered that vessel traffic and vessel-based activities associated with the operation and maintenance phase will not result in significant disturbance to harbour porpoise therefore this impact is screened out of further consideration for this species.

Bottlenose Dolphin

269. The nearest SAC for bottlenose dolphin is the Moray Firth SAC, located 224 km to the north west of the Proposed Development array area and bottlenose dolphin use of the Proposed Development array area is likely to be low. The small uplift in vessel activity during the operation and maintenance phase, compared to the baseline levels, is unlikely to result in a significant disturbance to bottlenose dolphin. Furthermore, as discussed in paragraph 245, the east coast bottlenose dolphin population is primarily distributed along the east coast from the Moray Firth to the north of the Firth of Forth and the species is mainly encountered in inshore areas. Any disturbance associated with activities near shore would be short term and the baseline suggests that bottlenose dolphin is unlikely to occur along this part of the coast. This impact is therefore screened out of further consideration for this species.

Harbour Seal

270. The usage of the Proposed Development by harbour seal is predicted to be low and there are no haul out sites near either landfall option which could be disturbed by vessels involved in maintenance activities along the Proposed Development offshore cable corridor. The location of ports to be used in support of the Proposed Development is not currently confirmed, although it is likely that the majority of vessel movements will be to/from local ports on the east coast of Scotland. Should operation and maintenance ports be located within the Firth of Tay then there is the potential for interaction between vessel movements and harbour seals using the Firth of Tay (see Appendix 2). There is therefore the potential for vessel movements and vessel-based operation and maintenance activities to result in disturbance to the harbour seal feature of the Firth of Tay and Eden Estuary SAC.

Grey Seal

271. Data indicate an overlap of grey seal movements and the Proposed Development and potential connectivity with the two European sites screened into the assessment of LSE (Isle of May SAC and the Berwickshire and North Northumberland Coast SAC). There is the potential for vessel movements associated with the operation and maintenance of the Proposed Development to result in disturbance to grey seal foraging in the Proposed Development array area and also to grey seal at haul out sites located in the close vicinity of the proposed ECC landfall options (i.e. within 2 km of the Thorntonloch Landfall, and ~5.5 km from the Skateraw Landfall; Figure 5.2). There is therefore considered to be the potential for vessel movements during the operation and maintenance phase and vessel-based operation and maintenance activities to result in a disturbance to grey seals.

Vessel Collision Risk

272. An increase in vessel activity associated with operation and maintenance activities may result in increased collisions with marine mammals. The extent of this potential disturbance will be spatially restricted to within the boundaries of the Proposed Development and along routes to local ports. Beyond this, the movements of vessels using already established vessel routes will be dispersed and will become part of the background vessel traffic.

Harbour Porpoise

273. The operation and maintenance of the Proposed Development is likely to result in a relatively small increase in vessel traffic compared to current background levels, and the majority of vessels associated with operation and maintenance activities are likely to be slow moving or stationary within the Proposed Development array area. The likelihood of collisions occurring between vessels and marine mammals is considered to be low and there is therefore considered to be little potential for the increased vessel activity during operation and maintenance activities to result in a significant impact to harbour porpoise in terms of collision risk with vessels. As such, no LSEs are anticipated to occur on harbour porpoise qualifying features of any European site and the impact of vessel collision risk is therefore screened out of further consideration for this species.

Bottlenose Dolphin

274. The increase in operation and maintenance vessel traffic is likely to be low compared to background levels, and the majority of vessels associated with operation and maintenance activities will be slow moving or

stationary within the Proposed Development array area. The likelihood of a collision occurring is considered to be low and therefore the increased vessel activity during operation and maintenance is unlikely to result in a significant impact to bottlenose dolphin in terms of collision risk with vessels. As such, no LSEs are anticipated to occur on bottlenose dolphin qualifying features of any European site and the impact of vessel collision risk is therefore screened out of further consideration for this species.

Harbour Seal

275. Usage of the Proposed Development by harbour seal is predicted to be low and there are no haul out sites within 40 km of either landfall option. The increase in operation and maintenance vessel traffic is likely to be low compared to background levels, and the majority of vessels associated with operation and maintenance activities will be slow moving or stationary within the Proposed Development array area. The likelihood of a collision occurring is considered to be low and therefore the increased vessel activity during operation and maintenance is unlikely to result in a significant impact to harbour seal in terms of collision risk with vessels. No LSEs are anticipated to occur on harbour seal qualifying features of any European site and the impact of vessel collision risk is therefore screened out of further consideration for this species.

Grey Seal

276. Existing data sources indicate an overlap between grey seal movements and the Proposed Development, as well as connectivity with the two European sites screened into the assessment of LSE (Isle of May SAC and the Berwickshire and North Northumberland Coast SAC). There are also grey seal haul outs in close proximity to the landfall options. The Advice on Operations for the SACs (e.g. Natural England and NatureScot, 2021) screened in identify collision risk for grey seal, however the text draws on the risk of corkscrew injuries from vessels which is no longer considered to be an impact associated with vessels (Brownlow *et al.,* 2016; Bishop *et al.,* 2016). The Advice on Operations acknowledges that in general instances of injury or mortality of grey seals caused by vessels remains a very rare occurrence in UK waters (Natural England and NatureScot, 2021).

277. The increase in vessel traffic associated with the operation and maintenance of the Proposed Development is likely to be low compared to background levels and likelihood of the impact occurring is considered to be low and there is therefore considered to be little potential for the increased vessel activity to result in a significant impact to grey seal in terms of collision risk with vessels. As such, no LSEs are anticipated to occur to grey seal qualifying features of any European site and the impact of vessel collision risk is therefore screened out of further consideration for grey seal.

Changes in Prey Availability

278. There is the potential for changes in marine mammal prey abundance and distribution to arise as a result of operation and maintenance activities and as a result of the presence of offshore structures. The potential for any adverse effects on prey are, however, significantly reduced compared to the construction phase as underwater noise will be substantially lower.

Harbour Porpoise

279. Harbour porpoise have a large foraging range and significant impacts to the fish communities in the vicinity of the Proposed Development during operation and maintenance activities are considered highly unlikely due to the reduced magnitude of any potential impact. In their response to the LSE Screening Report for the initial Berwick Bank Wind Farm Proposal (a smaller project), MSS and MS-LOT recommended that this impact be screened in for the operation and maintenance phase. On this basis, there is considered to be the potential for LSE from changes in prey availability on the harbour porpoise feature of the Southern North Sea SAC. All other European sites with harbour porpoise as features are located more than 292 km from the Proposed Development and so a significant effect occurring to features of these sites is considered highly unlikely and all other European sites for harbour porpoise are screened out.

Bottlenose Dolphin

280. The use of the Proposed Development by bottlenose dolphin is predicted to be low and the Moray Firth bottlenose dolphin population predominantly occurs in coastal areas (SSE, 2012). Significant impacts to the fish communities in the vicinity of the Proposed Development during operation and maintenance activities are considered highly unlikely due to the reduced magnitude of any potential impact and therefore significant effects to bottlenose dolphin from changes in prey abundance or distribution are also considered unlikely. As above for harbour porpoise, MSS and MS-LOT have however recommended that this impact be screened in for the operation and maintenance phase. On this basis, there is considered to be the potential for LSE from changes in prey availability on the bottlenose dolphin feature of the Moray Firth SAC.

Harbour Seal

281. Harbour seal usage of the Proposed Development is predicted to be low and the area is considered unlikely to be an important foraging area for this species. Significant effects on prey species during operation and maintenance activities are not anticipated and are therefore unlikely to result in a significant effect for harbour seal. As above for harbour porpoise, MSS and MS-LOT have however recommended that this impact be screened in for the operation and maintenance phase. On this basis, there is considered to be the potential for LSE from changes in prey availability on the harbour feature of the Firth of Tay and Eden Estuary SAC.

Grey Seal

282. The Proposed Development is likely to overlap with foraging grounds for grey seal (see Figure 5.1 and Appendix 2) from both the Berwickshire and North Northumberland Coast SAC and the Isle of May SAC. Effects on fish populations during the operation and maintenance phase will be less than during construction and are not expected to be significant, therefore, significant effects on harbour seal are considered unlikely. As above for harbour porpoise, MSS and MS-LOT have however recommended that this impact be screened in for the operation and maintenance phase. On this basis, there is considered to be the potential for LSE from changes in prey availability on the grey seal feature of the Berwickshire and North Northumberland Coast SAC and Isle of May SAC.

Operational Noise

283. The MMO (2014) review of post-consent monitoring at offshore wind farms in the UK and elsewhere in Europe showed that noise levels from operational wind turbines are low and the spatial extent of the potential impact on marine mammals is generally estimated to be small, with behavioural responses only likely at ranges close to wind turbines.

Harbour Porpoise

284. Although harbour porpoise are likely to be present throughout the Proposed Development, several published studies provide evidence that they are not likely to be displaced from operational wind farms. At the Horns Rev and Nysted offshore wind farms in Denmark, long-term monitoring demonstrated that harbour porpoise were sighted regularly within the operational offshore wind farms, and within two years of operation, the populations had returned to levels that were comparable with the wider area (Diederichs *et al.,* 2008). Similarly, a monitoring programme at the Egmond aan Zee offshore wind farm in the Netherlands reported significantly more harbour porpoise activity in the offshore wind farm during the operational phase compared to the reference area (Scheidat *et al.,* 2011). Other studies at Dutch and

Danish offshore wind farms (Lindeboom *et al.,* 2011) also suggest that harbour porpoise may be attracted to increased foraging opportunities within operating offshore wind farms. Other reviews have also concluded that operational wind farm noise will have negligible effects (Madsen *et al.,* 2006; Teilmann *et al.,* 2006a; Teilmann *et al.,* 2006b; CEFAS 2010; Brasseur *et al.,* 2012). There is therefore considered to be no potential for LSE as a result of wind turbine noise during the operation and maintenance phase and this impact is screened out of further consideration for this species.

Bottlenose Dolphin

285. Noise levels from operational wind turbines are predicted to be low and the spatial extent of any potential behavioural impact to bottlenose dolphin will be small. Given the low abundance of bottlenose dolphin within the Proposed Development array area there is considered to be no potential for LSE as a result of wind turbine noise during the operation and maintenance phase and this impact is screened out of further consideration for this species.

Harbour Seal

286. Several published studies provide evidence that harbour seals are unlikely to be displaced from operational wind farms. At the Horns Rev and Nysted offshore wind farms in Denmark, long-term monitoring showed that harbour seals were sighted regularly within the operational offshore wind farms, and within two years of operation, the populations had returned to levels that were comparable with the wider area (Diederichs *et al.,* 2008). In addition, recent tagging work has shown that some harbour seals demonstrated grid-like movement patterns as these animals moved between individual wind turbines at operational wind farms, strongly suggesting these structures are used to support foraging (Russell *et al.,* 2014; Russel *et al.,* 2016). The use of the Proposed Development by harbour seal is also likely to be low. There is therefore considered to be no potential for LSE on harbour seal as a result of wind turbine noise during the operation and maintenance phase, and this impact is screened out of further consideration for this species.

Grey Seal

287. As for harbour seal, grey seal are considered unlikely to be displaced from the Proposed Development array area during the operational phase. Tagging work by Russell *et al.,* (2014) found that some tagged grey seals demonstrated grid-like movement patterns as these animals moved between individual wind turbines, suggesting the use of wind turbines by grey seal to support foraging. There is therefore considered to be no potential for LSE on grey seal as a result of wind turbine noise during the operation and maintenance phase, and this impact is screened out of further consideration for this species.

EMF

All Species

288. The presence of subsea electrical cabling has the potential to emit a localised EMF. Based on the data available to date, there is no evidence of EMF related to marine renewable devices having any impact (either beneficial or adverse) on marine mammals (Copping, 2018). There is no evidence that seals can detect or respond to EMF, however some species of cetaceans may be able to detect variations in magnetic fields (Normandeau *et al.,* 2011). To date, the only marine mammal known to show any response to EMF is the Guiana dolphin *Sotalia guianensis* which has been shown to possess an electroreceptive system, which uses the vibrissal crypts on their rostrum to detect electrical stimuli similar to those generated by small to medium sized fish (Czech-Damal *et al.,* 2013). However, this has not been shown in any other species of marine mammal and this species does not occur within the Proposed Development. The impact of EMF on all marine mammal features of European sites is, therefore, screened out of further consideration.

Accidental Pollution

All Species

289. The potential for LSE on Annex II marine mammal features of European sites as a result of accidental pollution can be discounted at this stage and is therefore screened out. The justification is as presented previously in section 5.4.3 – Construction Phase: Accidental Pollution.

Decommissioning Phase

290. The impacts during the decommissioning phase are considered to be similar and potentially less than those outlined above in the construction phase (section 5.4.3 – Construction Phase).

5.4.4. DETERMINATION OF LSE FOR MARINE MAMMALS

291. Table 5.10 to Table 5.15 presents the results of the LSE determination assessment as a result of the Proposed Development on relevant qualifying interest features of the European sites identified for marine mammals. Separate LSE screening tables are presented for each of the UK sites and a single table (Table 5.15) has been produced to cover the 19 transboundary sites screened into the LSE assessment for harbour porpoise. This is because the justifications for the screening decisions were the same for all of the transboundary sites on the basis of the distance of these sites from the Proposed Development.

292. These assessments have been made in the absence of mitigation measures. The footnotes to these tables provide a brief assessment to support the screening in or out of each of these likely significant effects on the identified SAC features. Where effects are not applicable to a particular feature they are greyed out.

Likely Significant Effects in combination

293. The LSE test requires consideration of the Proposed Development alone and/ or in-combination with other plans and projects. Therefore, it is not necessary at the LSE stage to consider sites/features for which an LSE 'alone' has already been identified, as in-combination effects will be considered at the Appropriate Assessment. The focus at this stage should be to identify sites/features for which no LSE alone was concluded, but for which there is potential for a LSE in-combination to occur in combination with other plans or projects(e.g. due to wide foraging ranges resulting in a species interacting with a large number of projects).

294. Given the highly precautionary method for site selection applied during this Screening assessment, it is considered that the consolidation of information regarding external plans and projects would not likely result in additional LSEs being identified for the Screening assessment. For marine mammals, the potential for LSE alone is identified for all UK sites within species range, therefore effects in-combination will be considered at Appropriate Assessment.

295. With respect to the 19 transboundary sites over the distances considered, all relevant effect-pathways are considered extremely weak, such that only a negligible (if even detectable) effects would be apparent. Such effects are considered to be negligible and could not contribute in any material way to an in-combination effect and as such, in-combination effects associated with planned projects or other activities in the vicinity of the Proposed Development are also not anticipated for the harbour porpoise feature of any transboundary site.

Table 5.10: LSE Matrix for Marine Mammal Features of the Berwickshire and North Northumberland Coast SAC

European Site Qualifying Interest Features	Underwater Noise from Piling			Underwater Noise from Clearance of UXO			Underwater Noise from Pre-construction Surveys			Underwater Noise from Vessels and Other Vessel Activities			Vessel Collision Risk			Changes in Prey Availability			Changes in Water Clarity			Operational Noise			EMF			Accidental Pollution			In-combination effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Grey seal	✓a			✓a			✓a			✓b	✓b	✓b	×c	×c	×c	✓d	✓d	✓d	×e		×e		×f			×g		×h	×h	×h	✓i	✓i	✓i

a: **Underwater noise from piling, UXO clearance and pre-construction surveys** – telemetry data indicates potential connectivity between the Proposed Development and this SAC. The Proposed Development is located 30.1 km from the site which is within the screening range of 100 km used for grey seal based on typical foraging ranges and so there is the potential for grey seal qualifying features of this SAC to occur within the zone of impact (injury and behavioural) from noise associated with piling during construction, UXO clearance activities and pre-construction surveys (e.g. geophysical surveys). There is therefore considered to be potential for LSE from underwater noise during construction.

b: **Underwater noise from vessels and other vessel activities** – available data indicate an overlap between grey seal movements and the Proposed Development, and potential connectivity between this SAC and the Proposed Development. There is therefore considered to be potential for LSE from vessel noise across all phases of the Proposed Development.

c: **Vessel collision risk** – the increase in vessel traffic associated with the construction, operation and maintenance and decommissioning of the Proposed Development is likely to be low compared to background levels and likelihood of the impact occurring is considered to be low and there is therefore considered to be little potential for the increased vessel activity across all phases to result in a significant impact to grey seal in terms of collision risk with vessels. It is therefore concluded that there is no potential for LSE from vessel collision risk across all phases of the Proposed Development.

d: **Changes in prey availability** – the majority of effects on fish populations across all phases of the Proposed Development are likely to be temporary, localised, short-term and not significant. The widest ranging effect will be underwater noise during construction, and impacts to prey species will be assessed using underwater noise modelling for the EIA. Given the likely importance of the Proposed Development as a foraging area for grey seal from this SAC, there is considered to be potential for LSE across all phases of the Proposed Development.

e: **Changes in water clarity** – grey seal frequently occur in turbid environments and are adapted to navigating and locating prey in such conditions. Increases in SSC during construction and decommissioning will be localised, short-term and intermittent and unlikely to result in significant effects to the foraging ability of grey seal. It is considered that there is no potential for LSE from changes in water clarity.

f: **Operational noise** – noise levels from operational wind turbines are predicted to be low and the spatial extent of any potential behavioural impact to grey seal will be small. Several published studies indicate that grey seal are not likely to be displaced from the operational wind farm and so there is considered to be no potential for LSE as a result of wind turbine noise during the operation and maintenance phase.

g: **EMF** – there is no evidence of EMF related to marine renewable devices having any impact (either beneficial or adverse) on marine mammals and there is no evidence that seals can detect or respond to EMF. It is concluded that there is no potential for LSE from EMF during the operation and maintenance phase.

h: **Accidental pollution** – a good practice approach will be implemented as part of the Proposed Development via post-consent plans (e.g. a PEMMP) to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, irrespective of the possible effects on European sites. Following advice from NS (2021) and MSS (2021), accidental pollution associated with construction activities is not considered as an effect pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans. This rationale is taken to apply to all phases of the Proposed Development and the potential for LSE is discounted.

i: **In-combination effects** - Activities associated with planned projects or other activities in the vicinity of the Proposed Development have the potential to result in LSE to Annex II grey seal features of the SAC as a result of in-combination effects across all phases of the Proposed Development. Where potential for LSE has been concluded alone, the potential for LSE has been concluded in-combination.

Table 5.11: LSE Matrix for Marine Mammal Features of the Isle of May SAC

European Site Qualifying Interest Features	Underwater Noise from Piling			Underwater Noise from Clearance of UXO			Underwater Noise from Pre-construction Surveys			Underwater Noise from Vessels and Other Vessel Activities			Vessel Collision Risk			Changes in Prey Availability			Changes in Water Clarity			Operational Noise			EMF			Accidental Pollution			In-combination effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Grey seal	✓a			✓a			✓a			✓b	✓b	✓b	×c	×c	×c	✓d	✓d	✓d	×e		×e		×f			×g		×h	×h	×h	✓i	✓i	✓i

a: **Underwater noise from piling, UXO clearance and pre-construction surveys** – telemetry data indicates potential connectivity between the Proposed Development and this SAC. The Proposed Development array area is located 38.5 km from the site which is within the screening range of 100 km used for grey seal based on typical foraging ranges and so there is the potential for grey seal qualifying features of this SAC to occur within the zone of impact (injury and behavioural) from noise associated with piling during construction, UXO clearance activities and pre-construction surveys (e.g. geophysical surveys). There is therefore considered to be potential for LSE from underwater noise during the construction phase.

b: **Underwater noise from vessels and other vessel activities** – available data indicate an overlap between grey seal movements and the Proposed Development, and potential connectivity between this SAC and the Proposed Development. Important haul out sites for grey seal are also in close proximity to the proposed ECC. There is therefore considered to be potential for LSE across all phases of the Proposed Development as a result of noise from vessels.

c: **Vessel collision risk** – the increase in vessel traffic associated with the construction, operation and maintenance and decommissioning of the Proposed Development is likely to be low compared to background levels and likelihood of the impact occurring is considered to be low and there is therefore considered to be little potential for the increased vessel activity across all phases to result in a significant impact to grey seal in terms of collision risk with vessels. It is therefore concluded that there is no potential for LSE from vessel collision risk across all phases of the Proposed Development.

d: **Changes in prey availability** – the majority of effects on fish communities in the vicinity of the Proposed Development are anticipated to be temporary, localised, short-term and not significant. The widest ranging effect will be underwater noise during construction, and impacts to prey species will be assessed using underwater noise modelling for the EIA. Given the likely importance of the Proposed Development as a foraging area for grey seal from this SAC, there is considered to be potential for LSE across all phases of the Proposed Development.

e: **Changes in water clarity** – grey seal frequently occur in turbid environments and are adapted to navigating and locating prey in such conditions. Increases in SSC during construction and decommissioning will be localised, short-term and intermittent and unlikely to result in significant effects to the foraging ability of grey seal. It is considered that there is no potential for LSE from changes in water clarity.

f: **Operational noise** – noise levels from operational wind turbines are predicted to be low and the spatial extent of any potential behavioural impact to grey seal will be small. Several published studies indicate that grey seal are not likely to be displaced from the operational wind farm and so there is considered to be no potential for LSE as a result of wind turbine noise during the operation and maintenance phase.

g: **EMF** – there is no evidence of EMF related to marine renewable devices having any impact (either beneficial or adverse) on marine mammals and there is no evidence that seals can detect or respond to EMF. It is concluded that there is no potential for LSE from EMF during the operation and maintenance phase.

h: **Accidental pollution** – a good practice approach will be implemented as part of the Proposed Development via post-consent plans (e.g. a PEMMP) to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, irrespective of the possible effects on European sites. Following advice from NS (2021) and MSS (2021), accidental pollution associated with construction activities is not considered as an effect pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans. This rationale is taken to apply to all phases of the Proposed Development and the potential for LSE is discounted.

i: **In-combination effects** - activities associated with planned projects or other activities in the vicinity of the Proposed Development have the potential to result in LSE to Annex II grey seal features of the SAC as a result of in-combination effects across all phases of the Proposed Development. Where potential for LSE has been concluded alone, the potential for LSE has been concluded in-combination.

Table 5.12: LSE Matrix for Marine Mammal Features of the Firth of Tay and Eden Estuary SAC

European Site Qualifying Interest Features	Underwater Noise from Piling			Underwater Noise from Clearance of UXO			Underwater Noise from Pre-construction Surveys			Underwater Noise from Vessels and Other Vessel Activities			Vessel Collision Risk			Changes in Prey Availability			Changes in Water Clarity			Operational Noise			EMF			Accidental Pollution			In-combination effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Harbour seal	✓a			✓a			✓a			✓b	✓b	✓b	×c	×c	×c	✓d	✓d	✓d	×e		×e		×f			×g		×h	×h	×h	✓i	✓i	✓i

a: **Underwater noise from piling, UXO clearance and pre-construction surveys** – telemetry data indicates potential connectivity between the Proposed Development and this SAC. The Proposed Development is within the foraging range of harbour seal. There is therefore the potential for harbour seal features of this SAC to be within the zone of impact (injury and behavioural) from noise associated with piling during construction, UXO clearance activities and pre-construction surveys (e.g. geophysical surveys). There is therefore considered to be potential for LSE from underwater noise during the construction phase.

b: **Underwater noise from vessels and other vessel activities** - usage of the Proposed Development by harbour seal is predicted to be low and there are no haul out sites within 40 km of the landfall options which could be disturbed by vessel noise. The location of ports to be used in support of the Proposed Development is not, however, currently confirmed and should any ports be located within the Firth of Tay then there is the potential for interaction between vessels and harbour seals using the Firth of Tay. There is therefore considered to be the potential for LSE from underwater noise associated with vessel movements.

c: **Vessel collision risk** - the increase in vessel traffic associated with the construction, operation and maintenance and decommissioning of the Proposed Development is likely to be low compared to background levels and likelihood of the impact occurring is considered to be low and there is therefore considered to be little potential for the increased vessel activity across all phases to result in a significant impact to grey seal in terms of collision risk with vessels. It is therefore concluded that there is no potential for LSE from collision risk associated with vessel movements.

d: **Changes in prey availability** - the majority of effects on fish communities in the vicinity of the Proposed Development are anticipated to be temporary, localised, short-term and not significant. The widest ranging effect will be underwater noise during construction, and impacts to prey species will be assessed using underwater noise modelling for the EIA. There is therefore considered to be potential for LSE as a result of changes to prey availability across all phases of the Proposed Development.

e: **Changes in water clarity** – harbour seal frequently occur in turbid environments and are adapted to navigating and locating prey in such conditions. Increases in SSC during construction and decommissioning will be localised, short-term and intermittent and unlikely to result in significant effects to the foraging ability of harbour seal. It is considered that there is no potential for LSE from changes in water clarity.

f: **Operational noise** – noise levels from operational wind turbines are predicted to be low and the spatial extent of any potential behavioural impact to harbour seal will be small. Several published studies indicate that harbour seal are not likely to be displaced from the operational wind farm and so there is considered to be no potential for LSE as a result of wind turbine noise during the operation and maintenance phase.

g: **EMF** – there is no evidence of EMF related to marine renewable devices having any impact (either beneficial or adverse) on marine mammals and there is no evidence that seals can detect or respond to EMF. It is concluded that there is no potential for LSE from EMF during the operation and maintenance phase.

h: **Accidental pollution** – a good practice approach will be implemented as part of the Proposed Development via post-consent plans (e.g. a PEMMP) to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, irrespective of the possible effects on European sites. Following advice from NS (2021) and MSS (2021), accidental pollution associated with construction activities is not considered as an effect pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans. This rationale is taken to apply to all phases of the Proposed Development and the potential for LSE is discounted.

i: **In-combination effects** - activities associated with planned projects or other activities in the vicinity of the Proposed Development have the potential to result in LSE to the Annex II harbour seal feature of the SAC as a result of in-combination effects across all phases of the Proposed Development. Where potential for LSE has been concluded alone, the potential for LSE has been concluded in-combination.

Table 5.13: LSE Matrix for Marine Mammal Features of the Southern North Sea SAC

European Site Qualifying Interest Features	Underwater Noise from Piling			Underwater Noise from Clearance of UXO			Underwater Noise from Pre-construction Surveys			Underwater Noise from Vessels and Other Vessel Activities			Vessel Collision Risk			Changes in Prey Availability			Changes in Water Clarity			Operational Noise			EMF			Accidental Pollution			In-combination effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Harbour porpoise	✓a			✓a			✓a			×b	×b	×b	×c	×c	×c	✓d	✓d	✓d	×e		×e		×f			×g		×h	×h	×h	✓i	✓i	✓i

a: **Underwater noise from piling, UXO clearance and pre-construction surveys** – there is considered to be the potential for harbour porpoise from this site to be present (i.e. transiting or foraging) within the Proposed Development and zone of potential impact (injury and behavioural) from underwater noise associated with piling, UXO clearance activities and pre-construction surveys (e.g. geophysical surveys). There is therefore considered to be potential for LSE from underwater noise during the construction phase.

b: **Underwater noise from vessels and other vessel activities** - given the distance of the site from the Proposed Development (>144 km) and that the majority of vessel movements across all phases of the Proposed Development will likely be to/from ports on the east coast of Scotland, it is considered that vessel traffic will not result in a significant disturbance to qualifying features of the site. The uplift in vessel traffic across all phases of the Proposed Development is also likely be low compared to current background levels. It is therefore concluded that there is no potential for LSE from vessel noise.

c: **Vessel collision risk** - the uplift in vessel traffic across all phases of the Proposed Development is considered to be low compared to current background levels and the advice on operations for this SAC (JNCC and Natural England, 2019) does not identify the pressure of death/injury by collision as a significant risk. The likelihood of collisions occurring between vessels and marine mammals is considered to be low. It is therefore concluded that there is no potential for LSE from vessel collision risk across all phases of the Proposed Development.

d: **Changes in prey availability** – the majority of effects on fish communities in the vicinity of the Proposed Development are anticipated to be temporary, localised, short-term and not significant. The widest ranging effect will be underwater noise during construction, and impacts to prey species will be assessed using underwater noise modelling for the EIA. There is however considered to be potential for LSE from changes to prey availability across all phases of the Proposed Development.

e: **Changes in water clarity** – harbour porpoise frequently occur in turbid environments and are adapted to navigating and locating prey in such conditions. Increases in SSC during construction and decommissioning will be localised, short-term and intermittent and unlikely to result in significant effects to the foraging ability of harbour porpoise. It is considered that there is no potential for LSE from changes in water clarity.

f: **Operational noise** – noise levels from operational wind turbines are predicted to be low and the spatial extent of any potential behavioural impact to harbour porpoise will be small. Several published studies indicate that harbour porpoise are not likely to be displaced from the operational wind farm and so there is considered to be no potential for LSE as a result of wind turbine noise during the operation and maintenance phase.

g: **EMF** – there is no evidence of EMF related to marine renewable devices having any impact (either beneficial or adverse) on marine mammals and there is no evidence to indicate that harbour porpoise respond to EMF. It is concluded that there is no potential for LSE from EMF during the operation and maintenance phase.

h: **Accidental pollution** – a good practice approach will be implemented as part of the Proposed Development via post-consent plans (e.g. a PEMMP) to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, irrespective of the possible effects on European sites. Following advice from NS (2021) and MSS (2021), accidental pollution associated with construction activities is not considered as an effect pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans. This rationale is taken to apply to all phases of the Proposed Development and the potential for LSE is discounted.

i: **In-combination effects** – Activities associated with planned projects or other activities in the vicinity of the Proposed Development have the potential to result in LSE to Annex II harbour porpoise feature of the SAC as a result of in-combination effects across all phases of the Proposed Development. Where potential for LSE has been concluded alone, the potential for LSE has been concluded in-combination.

Table 5.14: LSE Matrix for Marine Mammal Features of the Moray Firth SAC

European Site Qualifying Interest Features	Underwater Noise from Piling			Underwater Noise from Clearance of UXO			Underwater Noise from Pre-construction Surveys			Underwater Noise from Vessels and Other Vessel Activities			Vessel Collision Risk			Changes in Prey Availability			Changes in Water Clarity			Operational Noise			EMF			Accidental Pollution			In-combination effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Bottlenose dolphin	✓a			✓a			✓a			×b	×b	×b	×c	×c	×c	✓d	✓d	✓d	×e		×e		×f			×g		×h	×h	×h	✓i	✓i	✓i

a: **Underwater noise from piling, UXO clearance and pre-construction surveys** – there is the potential for bottlenose dolphin features of this site to be present (i.e. transiting or foraging) within the Proposed Development and zone of potential impact (injury and behavioural) from underwater noise associated with piling, UXO clearance activities and pre-construction surveys (e.g. geophysical surveys). There is therefore considered to be potential for LSE from underwater noise during the construction phase.

b: **Underwater noise from vessels and other vessel activities** - given the distance of the site from the Proposed Development (224 km from the array area), the low numbers of bottlenose dolphin likely to be present in the area and that the majority of vessel movements across all phases of the Proposed Development will likely be to/from ports on the east coast of Scotland, it is considered that vessel traffic will not result in a significant disturbance to qualifying features of the site. The uplift in vessel traffic across all phases of the Proposed Development is also likely be low compared to current background levels. It is therefore concluded that there is no potential for LSE from vessel noise.

c: **Vessel collision risk** - the uplift in vessel traffic across all phases of the Proposed Development is considered to be low compared to current background levels and the likelihood of collisions occurring between vessels and marine mammals is considered to be low. It is therefore concluded that there is no potential for LSE from vessel collision risk across all phases of the Proposed Development.

d: **Changes in prey availability** - the majority of effects on fish communities in the vicinity of the Proposed Development are anticipated to be temporary, localised, short-term and not significant. The widest ranging effect will be underwater noise during construction, and impacts to prey species will be assessed using underwater noise modelling for the EIA. There is however considered to be potential for LSE from changes in prey availability across all phases of the Proposed Development.

e: **Changes in water clarity** – bottlenose dolphin frequently occur in turbid environments and are adapted to navigating and locating prey in such conditions. Increases in SSC during construction and decommissioning will be localised, short-term and intermittent and unlikely to result in significant effects to the foraging ability of this species. It is considered that there is no potential for LSE from changes in water clarity.

f: **Operational noise** – Noise levels from operational wind turbines are predicted to be low and the spatial extent of any potential behavioural impact to bottlenose dolphin will be small. Given the low abundance of bottlenose dolphin within the Proposed Development array area, there is considered to be no potential for LSE as a result of wind turbine noise during the operation and maintenance phase.

g: **EMF** – there is no evidence of EMF related to marine renewable devices having any impact (either beneficial or adverse) on marine mammals and there is no evidence to indicate that bottlenose dolphin respond to EMF. It is concluded that there is no potential for LSE from EMF during the operation and maintenance phase.

h: **Accidental pollution** – a good practice approach will be implemented as part of the Proposed Development via post-consent plans (e.g. a PEMMP) to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development irrespective of the possible effects on European sites. Following advice from NS (2021) and MSS (2021), accidental pollution associated with construction activities is not considered as an effect pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans. This rationale is taken to apply to all phases of the Proposed Development and the potential for LSE is discounted.

f: **In-combination effects** – Activities associated with planned projects or other activities in the vicinity of the Proposed Development have the potential to result in LSE to Annex II bottlenose dolphin feature of the SAC as a result of in-combination effects across all phases of the Proposed Development. Where potential for LSE has been concluded alone, the potential for LSE has been concluded in-combination.

Table 5.15: LSE Matrix for the 19 Transboundary Harbour Porpoise Sites

European Site Qualifying Interest Features	Underwater Noise from Piling			Underwater Noise from Clearance of UXO			Underwater Noise from Pre-construction Surveys			Underwater Noise from Vessels and Other Vessel Activities			Vessel Collision Risk			Changes in Prey Availability			Changes in Water Clarity			Operational Noise			EMF			Accidental Pollution			In-combination effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Harbour porpoise	×a			×a			×a			×b	×b	×b	×c	×c	×c	×d	×d	×d	×e		×e		×f			×g		×h	×h	×h	×i	×i	×i

a: **Underwater noise from piling, UXO clearance and pre-construction surveys** - given the significant distance of the nearest transboundary site to the Proposed Development (closest site is located 292 km from the array area), the Proposed Development is unlikely to constitute important foraging grounds for individuals from these sites and underwater noise during construction is unlikely to result in significant effects (disturbance or injury) on the harbour porpoise features of these sites. It is therefore concluded that there is no potential for LSE on the Annex II harbour porpoise feature of any transboundary site during the construction phase from piling, UXO clearance activities or pre-construction surveys (e.g. geophysical surveys).

b: **Underwater noise from vessels and other vessel activities** - given the large distances of all transboundary sites from the Proposed Development (closest site is located 292 km from the array area) and that the majority of vessel movements across all phases of the Proposed Development will likely be to/from ports on the east coast of Scotland, it is considered that vessel traffic will not result in a significant disturbance to Annex II harbour porpoise feature of any transboundary site. It is therefore concluded that there is no potential for LSE from vessel noise across all phases of the Proposed Development.

c: **Vessel collision risk** - the uplift in vessel traffic across all phases of the Proposed Development is considered to be low compared to current background levels and the likelihood of collisions occurring between vessels and marine mammals is considered to be low. Furthermore, the minimum distance between the Proposed Development and the nearest transboundary site is 292 km. There is therefore considered to be little potential for increased vessel activity to result in a significant effect in terms of collision risk and so it is concluded that there is no potential for LSE to the harbour porpoise feature of any transboundary site from vessel collision risk across all phases of the Proposed Development.

d: **Changes in prey availability** – any impacts to the fish community during the construction phase are anticipated to be highly localised, of short-term duration and temporary in nature. Impacts during the operation and maintenance and decommissioning phases are expected to be substantially less than during construction (as no piling will be required during the operation and maintenance phase). In addition, given the distance of the Proposed Development from the nearest transboundary site (292 km from the Proposed Development array area) and the large foraging range of this species, significant impacts to the foraging ability of harbour porpoise are considered unlikely. It is therefore concluded that there is no potential for LSE to the harbour porpoise feature of any transboundary site as a result of changes to prey availability across all phases of the Proposed Development.

e: **Changes in water clarity** – given the large distance between the Proposed Development and the transboundary sites for harbour porpoise (closest site is 292 km from the Proposed Development array area) and the fact that increases in SSC will be localised, short-term and intermittent, they are considered unlikely to result in significant effects to the foraging ability of harbour porpoise. It is considered that there is no potential for LSE on the Annex II harbour porpoise feature of any transboundary site from changes in water clarity.

f: **Operational noise** – noise levels from operational wind turbines are predicted to be low and the spatial extent of any potential behavioural impact to harbour porpoise will be small. Given the large distance between the Proposed Development and the transboundary sites for harbour porpoise (closest site is 292 km from the Proposed Development array area) and that several published studies indicate that harbour porpoise are not likely to be displaced from the operational wind farm, there is considered to be no potential for LSE as a result of wind turbine noise during the operation and maintenance phase.

g: **EMF** – there is no evidence of EMF related to marine renewable devices having any impact (either beneficial or adverse) on marine mammals and there is no evidence to indicate that harbour porpoise respond to EMF. It is concluded that there is no potential for LSE from EMF during the operation and maintenance phase.

h: **Accidental pollution** - a good practice approach will be implemented as part of the Proposed Development via post-consent plans (e.g. a PEMMP) to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development irrespective of the possible effects on European sites. Following advice from NS (2021) and MSS (2021), accidental pollution associated with construction activities is not considered as an effect pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans. This rationale is taken to apply to all phases of the Proposed Development and the potential for LSE is discounted.

f: **In-combination effects** – over the distances considered, all relevant effect-pathways are considered extremely weak, such that only a negligible (if even detectable) influence would be apparent. Such effects could not contribute to any material degree to an in-combination effect and as such, in-combination effects associated with planned projects or other activities in the vicinity of the Proposed Development are also not anticipated for the harbour porpoise feature of any transboundary site.

5.5. ASSESSMENT OF LSE FOR MARINE ORNITHOLOGICAL FEATURES

5.5.1. SITE OVERVIEWS

296. As outlined in section 4.4, a total of 46 European sites were identified in the initial screening process to be taken forward for determination of LSE. These sites and the associated qualifying features are set out in Table 5.16 below. Within Table 5.16, the sites are distinguished according to the four categories identified in section 4.4.2 (with the migratory waterbird SPA category subdivided according to whether sites are estuarine or inland), and, within each of these categories, listed in order of increasing distance from the Proposed Development.

Table 5.16: The SPAs and Ramsar sites taken forward for determination of LSE, with details of the associated qualifying features

European Site	Relevant Qualifying Features[1]
Marine SPAs	
Outer Firth of Forth and St Andrews Bay Complex SPA	• Arctic tern (breeding) • common tern (breeding) • little gull (non-breeding) • red-throated diver (non-breeding) • Slavonian grebe (non-breeding) • gannet (breeding) • shag (breeding) • eider (non-breeding) • seabird assemblage (breeding) including the components: – puffin – kittiwake – Manx shearwater – guillemot – herring gull • seabird assemblage (non-breeding) including the components: – black-headed gull – common gull – herring gull – guillemot – shag – kittiwake – razorbill • Waterfowl assemblage (non-breeding) including the components: – long-tailed duck – common scoter – velvet scoter – goldeneye – red-breasted merganser
Breeding seabird colony SPAs	
St Abb's Head to Fast Castle SPA	• seabird assemblage (breeding) including the components: – guillemot – razorbill – herring gull – kittiwake
Forth Islands SPA	• Arctic tern (breeding)[2] • common tern (breeding)[2] • gannet (breeding) • lesser black-backed gull (breeding)[2] • puffin (breeding) • seabird assemblage (breeding) including the components: – guillemot – razorbill – kittiwake – herring gull
Fowlsheugh SPA	• seabird assemblage (breeding) including the components: – fulmar – guillemot – herring gull – kittiwake – razorbill
Farne Islands SPA	• guillemot (breeding) • seabird assemblage (breeding) including the components: – kittiwake – puffin
Coquet Island SPA	• seabird assemblage (breeding) including the components: – puffin – fulmar – herring gull – lesser black-backed gull[2] – kittiwake
Buchan Ness to Collieston Coast SPA	• seabird assemblage (breeding) including the components: – kittiwake – guillemot – fulmar

European Site	Relevant Qualifying Features[1]
Troup, Pennan and Lion's Heads SPA	• kittiwake (breeding) • guillemot (breeding) • seabird assemblage (breeding) including the components: – fulmar – razorbill
East Caithness Cliffs SPA	• razorbill (breeding)[3] • kittiwake (breeding) • seabird assemblage (breeding) including the components: – fulmar
Flamborough and Filey Coast SPA	• gannet (breeding) • kittiwake (breeding) • razorbill (breeding)[3] • seabird assemblage (breeding) including the components: – fulmar – puffin
North Caithness Cliffs SPA	• seabird assemblage (breeding)) including the components: – fulmar – kittiwake – puffin
Hoy SPA	• great skua (breeding)[3] • seabird assemblage (breeding) including the components: – puffin – kittiwake – fulmar
Copinsay SPA	• seabird assemblage (breeding) including the components: – kittiwake – fulmar
Handa SPA	• seabird assemblage (breeding) including the components: – fulmar
Cape Wrath SPA	• seabird assemblage (breeding) including the components: – fulmar
Shiant Isles SPA	• seabird assemblage (breeding) including the components: – fulmar
Rousay SPA	• seabird assemblage (breeding) including the components: – fulmar
Calf of Eday SPA	• seabird assemblage (breeding) including the components: – fulmar
West Westray SPA	• seabird assemblage (breeding) including the components: – fulmar
Sule Skerry and Sule Stack SPA	• gannet (breeding) • seabird assemblage (breeding)
Fair Isle SPA	• seabird assemblage (breeding) including the components: – gannet – fulmar
North Rona and Sula Sgeir SPA	• gannet (breeding) • fulmar (breeding) • seabird assemblage (breeding)
Sumburgh Head SPA	• seabird assemblage (breeding) including the components: – fulmar
Flannan Isles SPA	• seabird assemblage (breeding) including the components: – fulmar
Foula SPA	• great skua (breeding)[3] • seabird assemblage (breeding) including the components: – fulmar
Noss SPA	• gannet (breeding) • seabird assemblage (breeding) including the components: – fulmar
St Kilda SPA	• seabird assemblage (breeding) including the components: – fulmar
Fetlar SPA	• great skua (breeding)[3] • seabird assemblage (breeding) including the components: – fulmar
Hermaness, Saxa Vord and Valla Field SPA	• gannet (breeding) • great skua (breeding)[3] • seabird assemblage (breeding) including the components: – fulmar
Migratory waterbird sites (estuarine)	
Firth of Forth SPA and Ramsar site	• bar-tailed godwit (non-breeding) • golden plover (non-breeding) • knot (non-breeding) • pink-footed goose (non-breeding) • red-throated diver (non-breeding) • redshank (non-breeding) • Sandwich tern (passage) • shelduck (non-breeding) • Slavonian grebe (non-breeding) • turnstone (non-breeding)

European Site	Relevant Qualifying Features[1]
	• waterfowl assemblage (non-breeding) including the components: – scaup – great crested grebe – cormorant – curlew – eider – long-tailed duck – common scoter – velvet scoter – goldeneye – red-breasted merganser – oystercatcher – ringed plover – grey plover – dunlin – mallard – lapwing – wigeon
Montrose Basin SPA and Ramsar site	• greylag goose (non-breeding) • pink-footed goose (non-breeding) • redshank (non-breeding) • waterfowl assemblage (non-breeding) including the components: – oystercatcher – eider – wigeon – knot – dunlin – shelduck
Northumbria Coast SPA and Ramsar site	• purple sandpiper (non-breeding) • turnstone (non-breeding)
Firth of Tay and Eden Estuary SPA and Ramsar site	• bar-tailed godwit (non-breeding) • greylag goose (non-breeding) • pink-footed goose (non-breeding) • redshank (non-breeding) • waterfowl assemblage (non-breeding) including the components: – velvet scoter – cormorant – shelduck

European Site	Relevant Qualifying Features[1]
	– eider – common scoter – Icelandic black-tailed godwit – goldeneye – red-breasted merganser – goosander – oystercatcher – grey plover – sanderling – dunlin – long-tailed duck
Lindisfarne SPA and Ramsar site	• bar-tailed godwit (non-breeding) • common scoter (non-breeding) • dunlin (non-breeding) • eider (non-breeding) • golden plover (non-breeding) • grey plover (non-breeding) • greylag goose (non-breeding) • light-bellied brent goose (non-breeding) • long-tailed duck (non-breeding) • red-breasted merganser (non-breeding) • redshank (non-breeding) • ringed plover (non-breeding) • sanderling (non-breeding) • shelduck (non-breeding) • whooper swan (non-breeding) • wigeon (non-breeding) • waterbird assemblage (non-breeding)
Ythan Estuary, Sands of Forvie and Meikle Loch SPA, Ythan Estuary and Meikle Loch Ramsar site	• pink-footed goose (non-breeding) • waterfowl assemblage (non-breeding) including the components: – eider – lapwing – redshank
Migratory waterbird sites (inland waterbodies)	
Cameron Reservoir SPA and Ramsar site	• pink-footed goose (non-breeding)
Holburn Lake and Moss SPA and Ramsar site	• greylag goose (non-breeding)
Greenlaw Moor SPA and Ramsar site	• pink-footed goose (non-breeding)
Loch of Kinnordy SPA and Ramsar site	• greylag goose (non-breeding) • pink-footed goose (non-breeding)

European Site	Relevant Qualifying Features[1]
Din Moss - Hoselaw Loch SPA and Ramsar site	• greylag goose (non-breeding) • pink-footed goose (non-breeding)
Fala Flow SPA and Ramsar site	• pink-footed goose (non-breeding)
Loch Leven SPA and Ramsar site	• whooper swan (non-breeding) • pink-footed goose (non-breeding) • shoveler (non-breeding) • waterfowl assemblage (non-breeding) including the components: – cormorant – gadwall – teal – pochard – tufted duck – goldeneye
Gladhouse Reservoir SPA and Ramsar site	• pink-footed goose (non-breeding)
South Tayside Goose Roosts SPA and Ramsar site	• greylag goose (non-breeding) • pink-footed goose (non-breeding) • wigeon (non-breeding) • waterfowl assemblage (non-breeding)
Westwater SPA and Ramsar site	• pink-footed goose (non-breeding) • waterfowl assemblage (non-breeding)
Slamannan Plateau SPA	• taiga bean goose (non-breeding)

Notes:

1. The named components of the assemblage features which are listed exclude those which are also qualifying features in their own right.

2. Breeding seabird qualifying features which are included on the basis of potential connectivity during the breeding season only.

3. Breeding seabird qualifying features which are included on the basis of potential connectivity during the non-breeding season only.

5.5.2. PATHWAYS FOR LSE: POTENTIAL IMPACTS ON MARINE ORNITHOLOGICAL FEATURES

297. A range of potential impacts on the marine ornithological features have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Proposed Development. These are the impacts which are taken into account when determining the potential for LSE on the designated sites and seabirds or migratory waterbird features identified in section 4.4. The list of potential impacts on seabirds and migratory waterbirds has been compiled using the experience and knowledge gained from previous offshore wind farm projects, including the Seagreen 1 offshore wind farm development, as well as published literature. At this stage in the Proposed Development Programme, full analysis of baseline survey information for the Proposed Development has not yet been completed, therefore a precautionary approach is taken to the LSE screening.

298. Consideration of the potential impacts identified for the marine ornithological features is presented in the following sections to inform the determination of LSE in section 5.5.3. Many of the European sites screened in include an assemblage qualifying feature, with the named components of each of these assemblage features also being identified in Table 5.16. For the purposes of considering the potential effect pathways, these named components are treated as qualifying features (with the potential effect pathways also considered for the overall assemblage feature).

Construction Phase

Direct Habitat Loss

299. Direct habitat loss arising from the presence of infra-structure may occur during the construction phase of the Proposed Development. This is a temporary (and relatively short-term) effect in relation to the construction period and is unlikely to be significant for marine ornithological features using the array area. However, there is potential for effects to occur in relation to the offshore export cable corridor which passes through the Outer Firth of Forth and St Andrews Bay Complex SPA. Indirect loss of habitats used by marine ornithological features is assessed as displacement. Therefore, it is considered that there is potential for LSE in relation to the qualifying features of the Outer Firth of Forth and St Andrews Bay Complex SPA.

Disturbance and Displacement

300. For the purposes of determining LSE, disturbance and displacement are considered together although these effects will be treated as separate pathways in the assessment for adverse effects on integrity.

301. The presence of vessels and construction works may disturb seabirds from offshore foraging or roosting areas in the short-term, causing changes in behaviour or displacing them from the affected areas. Temporary disturbance/displacement may lead to a reduction in foraging opportunities or increased energy expenditure, resulting in decreased survival rates or productivity in the population. This would only be likely to apply to seabirds which use the area of the marine environment in which construction activities will occur. Although migratory waterbird species would not be significantly affected when passing through (or over) the Proposed Development site on migration (as they are not expected to forage or rest in the marine environment around the Proposed Development), the offshore export cable corridor passes through the Outer Firth of Forth and St Andrews Bay Complex SPA (so that there is the potential for LSE in relation to this site).

302. Given the above, and following advice from NS (2020a), it is considered that there is the potential for LSE to result from this effect pathway in relation to SPA populations of breeding kittiwake, guillemot, razorbill and puffin (as well as breeding seabird assemblages), the qualifying features of the Outer Firth of Forth and St Andrews Bay Complex SPA and the non-breeding red-throated diver population of the Firth of Forth SPA (due to the particular sensitivity of red-throated diver to anthropogenic disturbance – see section 4.4.2).

Changes to Prey Availability

303. Indirect impacts on seabirds may occur as a result of changes in prey distribution, availability or abundance. Reduction or disruption to prey availability to seabirds may cause displacement from foraging grounds in the area or reduced energy intake, affecting survival rates or productivity in the population in the short-term. Although migratory waterbird species would not be significantly affected when passing through (or over) the site on migration (as they are not expected to forage or rest in the marine environment

around the Proposed Development), the offshore export cable corridor passes through the Outer Firth of Forth and St Andrews Bay Complex SPA (so that there is the potential for LSE in relation to this site).

Accidental Pollution

304. Following advice from NS (2020a) and MSS (2020a), accidental pollution associated with construction activities is not considered as an effect pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

Operation and Maintenance Phase

Direct Habitat Loss

305. Direct habitat loss may occur during the operation and maintenance phase of the Proposed Development. Given the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting), direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations. Similarly, no effects are predicted on migratory waterbird populations as a result of birds passing through (or over) the Proposed Development site on migration. However, the offshore export cable corridor passes through the Outer Firth of Forth and St Andrews Bay Complex SPA, so that there is the potential for LSE in relation to the qualifying features of this site (as is the case for the construction period).

Disturbance and Displacement

306. As noted for the construction period, disturbance and displacement are considered together for the purposes of determining LSE but will be treated as separate pathways in the assessment for adverse effects on integrity.

307. The presence of operational wind turbines, as well as the associated maintenance activities, may disturb seabirds and displace them from foraging or roosting areas over the long-term. This may lead to a reduction in foraging opportunities or increased competition and energy expenditure, resulting in decreased survival rates or productivity in the population. Such effects may be most likely in relation to seabirds using the marine habitats within the Proposed Development array area, although species are known to vary in their sensitivity to displacement (e.g. large gull species show little evidence of displacement from offshore wind farms whereas gannet and red-throated diver show marked displacement - Dierschke *et al*., 2018; Dorsch *et al*., 2020). Additionally, the effects of such displacement are likely to be minimal for species such as gannet and fulmar (irrespective of their sensitivity to the effect), which have particularly large foraging ranges, because the resultant habitat loss will represent a small proportion of the available habitat. However, NS (2020a) and MSS (2020a) advise that emerging (but, as yet, unpublished) evidence suggests that the large distances over which gannets may be displaced, together with the increasing number of offshore wind farms (with implications for in-combination effects), means that there is potential for LSE due to the displacement of gannets during the breeding season.

308. Such disturbance and displacement effects do not have the potential for LSE in relation to migratory waterbirds because they do not forage or roost in the marine habitats around the Proposed Development and only transit the area on migration.

309. During operation, the offshore export cable is an immobile structure on the seabed with minimal maintenance activity involving vessel activity. As such, there is considered to be no potential for LSE due to disturbance and displacement associated with the offshore export cable corridor during the operational period.

Collision

310. Collisions of seabirds and/or migratory waterbirds with the rotating blades of the wind turbines may result in the death or injury of individuals. Such mortality may be additive, so could cause population declines or, in some situations, prevent population recovery. Therefore, seabird species which forage within, or commute through, the Proposed Development array area may be vulnerable to such effects, as is also the case for migratory waterbirds which transit this area on migration. For seabirds, collision risk may vary between species in relation to a range of factors associated with flight behaviour but with flight heights being of fundamental importance in predicting the vulnerability to this effect (Johnston *et al*., 2014a,b). Thus, species which fly at low heights and below the rotor swept area (e.g. fulmar and auk species) are not vulnerable to this effect pathway, in contrast to other species which generally fly at greater heights and are at risk of collision for a proportion of their flight time (e.g. kittiwake, large gull species and gannet). Given the offshore location of the Proposed Development array area, it is extremely unlikely that any of the migratory waterbird species associated with European sites would make more frequent movements across the Proposed Development array area (e.g. when commuting between foraging and roosting sites), and it is considered that collision risk for these species is limited to their migratory movements.

Barrier to Movement

311. Large scale offshore wind farms may act as barriers to seabird and/or migratory waterbird movements, causing individuals to fly around or over the wind turbine arrays. For migratory waterbird species making one-off movements across the Proposed Development array area, usually in spring and autumn, the increase in energy expenditure incurred as a result of such effects is unlikely to be of significance, given the substantial distances across which they migrate. However, seabird species that commute frequently across the Proposed Development array area could incur greater energetic costs as a consequence of these effects, with the potential for this to result in decreased survival rates or productivity in the population. In particular, this is relevant to seabirds during the breeding season, when they frequently commute between the colony and foraging areas (e.g. Searle *et al*., 2018).

Changes to Prey Availability

312. Indirect impacts on seabirds may occur as a result of changes in prey distribution, availability or abundance in the marine environment. Reduction or disruption to prey availability to seabirds may cause displacement from the area or reduced energy intake, affecting survival rates or productivity in the population in the long-term. Although migratory waterbird species would not be significantly affected when passing through (or over) the site on migration (as they are not expected to forage or rest in the marine environment around the Proposed Development), the offshore export cable corridor passes through the Outer Firth of Forth and St Andrews Bay Complex SPA (so that there is the potential for LSE in relation to this site).

Accidental Pollution

313. As discussed above in this section for the construction phase, accidental pollution is not considered as an effect pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans (NS, 2020a; MSS, 2020a).

Decommissioning Phase

314. The impacts during the decommissioning phase are considered to be similar and potentially less than those outlined above for the construction phase. The impacts of direct habitat loss, collision and barriers to movement are not applicable to the decommissioning phase and therefore have been greyed out in Table 5.16 to Table 5.62.

5.5.3. DETERMINATION OF LSE FOR MARINE ORNITHOLOGICAL FEATURES

315. Table 5.16 to Table 5.62 present the conclusions in relation to the determination of LSE as a result of the Proposed Development. Separate LSE screening tables are presented for each of the 46 European sites which are taken forward for determination of LSE on the basis of the information and analysis in section 4.4 (and which are listed in Table 5.15). The European Sites are listed in the same order as in Table 5.15, with the single marine SPA covered in Table 5.16, the breeding seabird colony SPAs in Table 5.17 to Table 5.44 and the migratory waterbird SPAs in Table 5.45 to Table 5.61. The conclusion on whether LSE can be excluded or not is presented for each of the qualifying features screened in for each of these 46 sites in relation to each effect pathway.

316. These assessments have been made in the absence of mitigation measures. The footnotes to these tables briefly outline the rationale for the conclusion in relation to LSE for each qualifying feature. Effects that are not applicable to a particular feature are greyed out.

Table 5.17: LSE Matrix for Marine Ornithological Features of the Outer Firth of Forth and St Andrews Bay Complex SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Gannet (breeding)	✓a	✓a		✓b	✓b	✓b		✓c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Guillemot (breeding)	✓a	✓a		✓b	✓b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Guillemot (non-breeding)	✓a	✓a		✓b	✓b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Herring gull (breeding)	✓a	✓a		✓b	×b	✓b		✓c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Herring gull (non-breeding)	✓a	✓a		✓b	×b	✓b		✓c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Kittiwake (breeding)	✓a	✓a		✓b	✓b	✓b		✓c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Kittiwake (non-breeding)	✓a	✓a		✓b	×b	✓b		✓c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Shag (breeding)	✓a	✓a		✓b	×b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Shag (non-breeding)	✓a	✓a		✓b	×b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Puffin (breeding)	✓a	✓a		✓b	✓b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Arctic tern (breeding)	✓a	✓a		✓b	×b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Common tern (breeding)	✓a	✓a		✓b	×b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Manx shearwater (breeding)	✓a	✓a		✓b	✓b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Black-headed gull (non-breeding)	✓a	✓a		✓b	×b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Common gull (non-breeding)	✓a	✓a		✓b	×b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Little gull (non-breeding)	✓a	✓a		✓b	✓b	✓b		✓c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Razorbill (non-breeding)	✓a	✓a		✓b	✓b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Seabird assemblage (breeding)	✓a	✓a		✓b	✓b	✓b		✓c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Seabird assemblage (non-breeding)	✓a	✓a		✓b	✓b	✓b		✓c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Common scoter (non-breeding)	✓a	✓a		✓b	×b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Eider (non-breeding)	✓a	✓a		✓b	×b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Goldeneye (non-breeding)	✓a	✓a		✓b	×b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Long-tailed duck (non-breeding)	✓a	✓a		✓b	×b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Red-breasted merganser (non-breeding)	✓a	✓a		✓b	×b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Red-throated diver (non-breeding)	✓a	✓a		✓b	×b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Slavonian grebe (non-breeding)	✓a	✓a		✓b	×b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Velvet scoter (non-breeding)	✓a	✓a		✓b	×b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Waterfowl assemblage (non-breeding)	✓a	✓a		✓b	×b	✓b		×c			×d		✓e	✓e	✓e	✓f	✓f	✓f

a: Direct habitat loss – as stated in section 5.5.2, LSE on the qualifying features of this SPA cannot be excluded as a result of direct habitat loss associated with the offshore export cable corridor during construction and operation.

b: Disturbance and displacement – for construction and decommissioning, it is considered that activities associated with the offshore export cable corridor and (for seabirds which may use the more offshore waters in the eastern parts of the SPA) the array area mean that LSE on the qualifying features of this SPA cannot be excluded.

For operation, no LSE is concluded in relation to the; (i) waterbird features; (ii) seabird features with breeding season foraging ranges which do not extend out to the array area from the nearest SPA colony locations (see Table 4.5) or which predominantly use more inshore habitats; and (iii) seabird features which are relatively insensitive to displacement (e.g. herring gull). For those seabirds features which are likely to use the more offshore waters in the eastern parts of the SPA and which may be sensitive to displacement, LSE cannot be excluded because of the potential for birds to be displaced from those parts of the SPA which are adjacent and close to the array area. Note, although the presence of wind turbines may result in the displacement of non-breeding red-throated diver over distances of several kilometres, the distribution of this qualifying feature is concentrated in the more inshore waters of this SPA (SNH 2018l) so that there is no potential for LSE from displacement associated with the wind turbines.

c: Collision – the primary function of this SPA is to protect important feeding, moulting and roosting areas for non-breeding inshore waterbirds and important feeding areas for seabirds during both the breeding and non-breeding seasons. In relation to seabirds, this SPA is used as a foraging area by breeding populations associated with nearby breeding seabird colony SPAs (e.g. the Forth Islands SPA). The array area is outside the SPA so there is no potential for LSE in relation to collisions for the majority of the qualifying features. However, given that the array area abuts the eastern boundary of this SPA, seabird features which use the more offshore waters may be expected to also use the array area on a frequent basis. Therefore, for those seabird features which use the more offshore waters and which are considered vulnerable to collisions, the potential for LSE in relation to collision effects cannot be excluded.

d. Barrier to movement – the primary function of this SPA is to protect important feeding, moulting and roosting areas for non-breeding inshore waterbirds and important feeding areas for seabirds during both the breeding and non-breeding seasons. In relation to seabirds, this SPA is used as a foraging area by breeding populations associated with nearby breeding seabird colony SPAs (e.g. the Forth Islands SPA). The array area is outside the SPA and only abuts the SPA along its eastern boundary, where the SPA extends furthest offshore. Therefore, it is considered that there is no potential for LSE in relation to barrier effects for either the waterbird or seabird qualifying features. Although some of the seabirds will use (and feed in) the waters adjacent to the array area, the array area will not act as a barrier in terms of movements within the SPA and, notably, during the breeding season it is unlikely to affect movements between the key breeding colonies and this SPA (based upon the respective locations – Figure 4.4).

e: Changes in prey availability – as detailed in section 5.5.2 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species (either in relation to the waterbird or seabird features of this SPA).

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects.

Table 5.18: LSE Matrix for Marine Ornithological Features of the St Abb's Head to Fast Castle SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	D	C	O&M	D	C	O&M	D	C	O&M
Guillemot (breeding)	×a	×a		✓b	✓b	✓b		×c				✓d		✓e	✓e	✓e	✓f	✓f
Razorbill (breeding)	×a	×a		✓b	✓b	✓b		×c				✓d		✓e	✓e	✓e	✓f	✓f
Herring gull (breeding)	×a	×a		×b	×b	×b		✓c				×d		✓e	✓e	✓e	✓f	✓f
Kittiwake (breeding)	×a	×a		✓b	✓b	✓b		✓c				✓d		✓e	✓e	✓e	✓f	✓f
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c				✓d		✓e	✓e	✓e	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – guillemot, razorbill and kittiwake from this SPA may be affected by disturbance and displacement from the Proposed Development array area and its surrounds. Herring gull is considered to be relatively insensitive to such effects. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only, whilst for the two auk species the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, razorbill, kittiwake and seabird assemblage qualifying features of this SPA.

c. Collision – kittiwake and herring gull may be vulnerable to collisions within the Proposed Development array area. Guillemot and razorbill generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake, herring gull and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – guillemot, razorbill and kittiwake from this SPA may be affected by barrier effects from the Proposed Development array area. Herring gull is considered to be relatively insensitive to such effects. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only, whilst for the two auk species the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, razorbill, kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.5.2 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species.

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects.

Table 5.19: LSE Matrix for Marine Ornithological Features of the Forth Islands SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Arctic tern (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓c		✓e	✓e	✓e	✓f	✓f	✓f
Common tern (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓c		✓e	✓e	✓e	✓f	✓f	✓f
Gannet (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓c		✓e	✓e	✓e	✓f	✓f	✓f
Herring gull (breeding)	×a	×a		×b	×b	×b		✓c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Lesser black-backed gull (breeding)	×a	×a		×b	×b	×b		✓c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Guillemot (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Puffin (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Razorbill (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Kittiwake (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – guillemot, razorbill, puffin, gannet and kittiwake from this SPA may be affected by disturbance and displacement from the Proposed Development array area and its surrounds. Herring gull and lesser black-backed gull are considered to be relatively insensitive to such effects. The potential for effects of disturbance and displacement on gannet has been identified on the basis of emerging evidence concerning the large distances over which this species is displaced, although previous advice suggested that the large foraging range of this species meant that effects of such displacement are unlikely to be important (NS 2020a, MSS 2020a, see section 5.5.2). For gannet and kittiwake displacement effects are likely to be limited to the breeding season only, whilst for the three auk species the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). Arctic tern and common tern are both considered relatively insensitive to anthropogenic disturbance when foraging and commuting in the marine environment, but evidence relating to the sensitivity of these species to displacement effects is sparse (Furness *et al.,* 2013, Dierschke *et al.,* 2018). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the Arctic tern, common tern, guillemot, razorbill, puffin, gannet, kittiwake and seabird assemblage qualifying features of this SPA.

c. Collision – Arctic tern, common tern, gannet, herring gull, lesser black-backed gull and kittiwake may be vulnerable to collisions within the Proposed Development array area. Guillemot, razorbill and puffin generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the Arctic tern, common tern, gannet, herring gull, lesser black-backed gull, kittiwake and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – guillemot, razorbill, puffin, gannet and kittiwake from this SPA may be affected by barrier effects from the Proposed Development array area. Herring gull and lesser black-backed gull are considered to be relatively insensitive to such effects. The potential for barrier effects on gannet has been identified on the basis of emerging evidence, although previous advice suggested that the large foraging range of this species meant that such barrier effects are unlikely to be important (NS 2020a, MSS 2020a). For gannet and kittiwake barrier effects are likely to be limited to the breeding season only, whilst for the three auk species the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). Arctic tern and common tern are both considered relatively insensitive to anthropogenic disturbance when foraging and commuting in the marine environment, but evidence relating to the sensitivity of these species to barrier effects is sparse (Furness *et al.,* 2013, Dierschke *et al.,* 2018). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the Arctic tern, common tern, guillemot, razorbill, puffin, gannet, kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.5.2 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species.

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects.

Table 5.20: LSE Matrix for Marine Ornithological Features of the Fowlsheugh SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Guillemot (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Razorbill (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Kittiwake (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Herring gull (breeding)	×a	×a		×b	×b	×b		✓c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – guillemot, razorbill and kittiwake from this SPA may be affected by disturbance and displacement from the Proposed Development array area and its surrounds. Herring gull is considered to be relatively insensitive to such effects, whilst the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only, whilst for the two auk species the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, razorbill, kittiwake and seabird assemblage qualifying features of this SPA.

c. Collision – kittiwake and herring gull may be vulnerable to collisions within the Proposed Development array area. Guillemot, razorbill and fulmar generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake, herring gull and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – guillemot, razorbill and kittiwake from this SPA may be affected by barrier effects from the Proposed Development array area. Herring gull is considered to be relatively insensitive to such effects, whilst the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only, whilst for the two auk species the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, razorbill, kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.5.2 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species.

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects. The exception in this regard is fulmar, for which no effect pathways to LSE are identified in relation to the Proposed Development (so that there is no potential to contribute to in-combination effects).

Table 5.21: LSE Matrix for Marine Ornithological Features of the Farne Islands SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Guillemot (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Puffin (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Kittiwake (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – guillemot, puffin and kittiwake from this SPA may be affected by disturbance and displacement from the Proposed Development array area and its surrounds. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only, whilst for the two auk species the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, puffin, kittiwake and seabird assemblage qualifying features of this SPA.

c. Collision – kittiwake may be vulnerable to collisions within the Proposed Development array area. Guillemot and puffin generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – guillemot, puffin and kittiwake from this SPA may be affected by barrier effects from the Proposed Development array area. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only, whilst for the two auk species the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, puffin, kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.5.2 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species.

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects.

Table 5.22: LSE Matrix for Marine Ornithological Features of the Coquet Island SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Kittiwake (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Herring gull (breeding)	×a	×a		×b	×b	×b		✓c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Lesser black-backed gull (breeding)	×a	×a		×b	×b	×b		✓c			×d		✓e	✓e	✓e	✓f	✓f	✓f
Puffin (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – puffin and kittiwake from this SPA may be affected by disturbance and displacement from the Proposed Development array area and its surrounds. Herring gull and lesser black-backed gull are considered to be relatively insensitive to such effects, whilst the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only, whilst for puffin the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the puffin, kittiwake and seabird assemblage qualifying features of this SPA.

c. Collision – kittiwake, herring gull and lesser black-backed gull may be vulnerable to collisions within the Proposed Development array area. Puffin and fulmar generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake, herring gull, lesser black-backed gull and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – puffin and kittiwake from this SPA may be affected by barrier effects from the Proposed Development array area. Herring gull and lesser black-backed gull are considered to be relatively insensitive to such effects, whilst the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only, whilst for puffin the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the puffin, kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.5.2 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species.

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects. The exception in this regard is fulmar, for which no effect pathways to LSE are identified in relation to the Proposed Development (so that there is no potential to contribute to in-combination effects.

Table 5.23: LSE Matrix for Marine Ornithological Features of the Buchan Ness to Collieston Coast SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Guillemot (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Kittiwake (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – guillemot and kittiwake from this SPA may be affected by disturbance and displacement from the Proposed Development array area and its surrounds. The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only, whilst for guillemot the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, kittiwake and seabird assemblage qualifying features of this SPA.

c. Collision – kittiwake may be vulnerable to collisions within the Proposed Development array area. Guillemot and fulmar generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – guillemot and kittiwake from this SPA may be affected by barrier effects from the Proposed Development array area. The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only, whilst for guillemot the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.5.2 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species.

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects. The exception in this regard is fulmar, for which no effect pathways to LSE are identified in relation to the Proposed Development (so that there is no potential to contribute to in-combination effects).

Table 5.24: LSE Matrix for Marine Ornithological Features of the Troup, Pennan and Lion's Heads SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Guillemot (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Razorbill (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Kittiwake (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – guillemot, razorbill and kittiwake from this SPA may be affected by disturbance and displacement from the Proposed Development array area and its surrounds. The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only, whilst for the two auk species the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, razorbill, kittiwake and seabird assemblage qualifying features of this SPA.

c. Collision – kittiwake may be vulnerable to collisions within the Proposed Development array area. Guillemot, razorbill and fulmar generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – guillemot, razorbill and kittiwake from this SPA may be affected by barrier effects from the Proposed Development array area. The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only, whilst for the two auk species the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, razorbill, kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.5.2 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species.

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects. The exception in this regard is fulmar, for which no effect pathways to LSE are identified in relation to the Proposed Development (so that there is no potential to contribute to in-combination effects).

Table 5.25: LSE Matrix for Marine Ornithological Features of the East Caithness Cliffs SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Razorbill (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Kittiwake (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – razorbill and kittiwake from this SPA may be affected by disturbance and displacement from the Proposed Development array area and its surrounds. The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only, whilst for this SPA razorbill is only considered to have connectivity with Proposed Development during the non-breeding season (see section 4.4.2) so the effect pathway for this species is limited to the non-breeding season. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the razorbill, kittiwake and seabird assemblage qualifying features of this SPA.

c. Collision – kittiwake may be vulnerable to collisions within the Proposed Development array area. Razorbill and fulmar generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – razorbill and kittiwake from this SPA may be affected by barrier effects from the Proposed Development array area. The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only, whilst for this SPA razorbill is only considered to have connectivity with Proposed Development during the non-breeding season (see section 4.4.2) so the effect pathway for this species is limited to the non-breeding season. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the razorbill, kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.5.2 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species.

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects. The exception in this regard is fulmar, for which no effect pathways to LSE are identified in relation to the Proposed Development (so that there is no potential to contribute to in-combination effects).

Table 5.26: LSE Matrix for Marine Ornithological Features of the Flamborough and Filey Coast SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Gannet (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Kittiwake (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Razorbill (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Puffin (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – puffin, razorbill, gannet and kittiwake from this SPA may be affected by disturbance and displacement from the Proposed Development array area and its surrounds. The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. The potential for effects of disturbance and displacement on gannet has been identified on the basis of emerging evidence concerning the large distances over which this species is displaced, although previous advice suggested that the large foraging range of this species meant that effects of such displacement are unlikely to be important (NS 2020a, MSS 2020a, see section 5.5.2). For gannet and kittiwake displacement effects are likely to be limited to the breeding season only, whilst for puffin the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). For this SPA, razorbill is only considered to have connectivity with Proposed Development during the non-breeding season (see section 4.4.2) so the effect pathway for this species is limited to the non-breeding season. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the razorbill, puffin, gannet, kittiwake and seabird assemblage qualifying features of this SPA.

c. Collision – gannet and kittiwake may be vulnerable to collisions within the Proposed Development array area. Razorbill, puffin and fulmar generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet, kittiwake and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – puffin, razorbill, gannet and kittiwake from this SPA may be affected by barrier effects from the Proposed Development array area. The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. The potential for barrier effects on gannet has been identified on the basis of emerging evidence, although previous advice suggested that the large foraging range of this species meant that such barrier effects are unlikely to be important (NS 2020a, MSS 2020a). For gannet and kittiwake barrier effects are likely to be limited to the breeding season only, whilst for puffin the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). For this SPA, razorbill is only considered to have connectivity with Proposed Development during the non-breeding season (see section 4.4.2) so the effect pathway for this species is limited to the non-breeding season. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the razorbill, puffin, gannet, kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.5.2 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species.

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects. The exception in this regard is fulmar, for which no effect pathways to LSE are identified in relation to the Proposed Development (so that there is no potential to contribute to in-combination effects).

Table 5.27: LSE Matrix for Marine Ornithological Features of the North Caithness Cliffs SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Puffin (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Kittiwake (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – puffin and kittiwake from this SPA may be affected by disturbance and displacement from the Proposed Development array area and its surrounds. The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only, whilst for puffin the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the puffin, kittiwake and seabird assemblage qualifying features of this SPA.

c. Collision – kittiwake may be vulnerable to collisions within the Proposed Development array area. Puffin and fulmar generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – puffin and kittiwake from this SPA may be affected by barrier effects from the Proposed Development array area. The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only, whilst for puffin the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020, NS 2020b). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the puffin, kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.5.2 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species.

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects. The exception in this regard is fulmar, for which no effect pathways to LSE are identified in relation to the Proposed Development (so that there is no potential to contribute to in-combination effects).

Table 5.28: LSE Matrix for Marine Ornithological Features of the Hoy SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Puffin (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Kittiwake (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Great skua (breeding)	×a	×a		×b	×b	×b		✓c			×d		×e	×e	×e	✓f	✓f	✓f
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – puffin and kittiwake from this SPA may be affected by disturbance and displacement from the Proposed Development array area and its surrounds. The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. For this SPA, great skua is only considered to have connectivity with Proposed Development during the non-breeding season (see section 4.4.2) and, on this basis, it is considered that disturbance and displacement from the Proposed Development array area would have minimal effects on the SPA population because of the substantial areas of alternative marine habitat available. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only, whilst for puffin the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the puffin, kittiwake and seabird assemblage qualifying features of this SPA.

c. Collision – kittiwake and great skua may be vulnerable to collisions within the Proposed Development array area. Puffin and fulmar generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake, great skua and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – puffin and kittiwake from this SPA may be affected by barrier effects from the Proposed Development array area. The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. For this SPA, great skua is only considered to have connectivity with Proposed Development during the non-breeding season (see section 4.4.2) and, on this basis, it is considered that any barrier effect associated with the Proposed Development array area would be of little consequence because of the infrequent occurrence of the effect on the SPA population. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only, whilst for puffin the effect pathway is considered relevant to both the breeding and non-breeding seasons (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the puffin, kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.5.2 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species. The exceptions in this regard are fulmar and great skua, for which this effect pathway is unlikely to be important because of the very extensive areas of alternative marine habitat available to these species (with the great skua SPA population having connectivity with the Proposed Development in the non-breeding season only).

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects. The exception in this regard is fulmar, for which no effect pathways to LSE are identified in relation to the Proposed Development (so that there is no potential to contribute to in-combination effects).

Table 5.29: LSE Matrix for Marine Ornithological Features of the Copinsay SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Kittiwake (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – kittiwake from this SPA may be affected by disturbance and displacement from the Proposed Development array area and its surrounds. The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

c. Collision – kittiwake may be vulnerable to collisions within the Proposed Development array area. Fulmar generally fly below the lower rotor swept height and is not considered vulnerable to collision effects. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – kittiwake from this SPA may be affected by barrier effects from the Proposed Development array area. The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.5.2 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species.

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects. The exception in this regard is fulmar, for which no effect pathways to LSE are identified in relation to the Proposed Development (so that there is no potential to contribute to in-combination effects).

Table 5.30: LSE Matrix for Marine Ornithological Features of the Handa SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Seabird assemblage (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

c. Collision – fulmar generally fly below the lower rotor swept height and is not considered vulnerable to collision effects. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

d: Barrier to movement – the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

e: Changes in prey availability – for fulmar this effect pathway is unlikely to be important because of the particularly large foraging range of the species (and hence extensive availability of alternative marine habitats). Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

f: In-combination effects – no effect pathways to LSE are identified in relation to the Proposed Development for any of the qualifying features which are considered to have connectivity with the Proposed Development. Therefore, it is concluded that there is no potential for the Proposed Development to contribute to in-combination effects on this SPA.

Table 5.31: LSE Matrix for Marine Ornithological Features of the Cape Wrath SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Seabird assemblage (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

c. Collision – fulmar generally fly below the lower rotor swept height and is not considered vulnerable to collision effects. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

d: Barrier to movement – the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

e: Changes in prey availability – for fulmar this effect pathway is unlikely to be important because of the particularly large foraging range of the species (and hence extensive availability of alternative marine habitats). Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

f: In-combination effects – no effect pathways to LSE are identified in relation to the Proposed Development for any of the qualifying features which are considered to have connectivity with the Proposed Development. Therefore, it is concluded that there is no potential for the Proposed Development to contribute to in-combination effects on this SPA.

Table 5.32: LSE Matrix for Marine Ornithological Features of the Shiant Isles SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Seabird assemblage (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

c. Collision – fulmar generally fly below the lower rotor swept height and is not considered vulnerable to collision effects. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

d: Barrier to movement – the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

e: Changes in prey availability – for fulmar this effect pathway is unlikely to be important because of the particularly large foraging range of the species (and hence extensive availability of alternative marine habitats). Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

f: In-combination effects – no effect pathways to LSE are identified in relation to the Proposed Development for any of the qualifying features which are considered to have connectivity with the Proposed Development. Therefore, it is concluded that there is no potential for the Proposed Development to contribute to in-combination effects on this SPA.

Table 5.33: LSE Matrix for Marine Ornithological Features of the Rousay SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Seabird assemblage (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

c. Collision – fulmar generally fly below the lower rotor swept height and is not considered vulnerable to collision effects. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

d: Barrier to movement – the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

e: Changes in prey availability – for fulmar this effect pathway is unlikely to be important because of the particularly large foraging range of the species (and hence extensive availability of alternative marine habitats). Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

f: In-combination effects – no effect pathways to LSE are identified in relation to the Proposed Development for any of the qualifying features which are considered to have connectivity with the Proposed Development. Therefore, it is concluded that there is no potential for the Proposed Development to contribute to in-combination effects on this SPA.

Table 5.34: LSE Matrix for Marine Ornithological Features of the Calf of Eday SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Seabird assemblage (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

c. Collision – fulmar generally fly below the lower rotor swept height and is not considered vulnerable to collision effects. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

d: Barrier to movement – the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

e: Changes in prey availability – for fulmar this effect pathway is unlikely to be important because of the particularly large foraging range of the species (and hence extensive availability of alternative marine habitats). Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

f: In-combination effects – no effect pathways to LSE are identified in relation to the Proposed Development for any of the qualifying features which are considered to have connectivity with the Proposed Development. Therefore, it is concluded that there is no potential for the Proposed Development to contribute to in-combination effects on this SPA.

Table 5.35: LSE Matrix for Marine Ornithological Features of the West Westray SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Seabird assemblage (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

c. Collision – fulmar generally fly below the lower rotor swept height and is not considered vulnerable to collision effects. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

d: Barrier to movement – the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

e: Changes in prey availability – for fulmar this effect pathway is unlikely to be important because of the particularly large foraging range of the species (and hence extensive availability of alternative marine habitats). Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

f: In-combination effects – no effect pathways to LSE are identified in relation to the Proposed Development for any of the qualifying features which are considered to have connectivity with the Proposed Development. Therefore, it is concluded that there is no potential for the Proposed Development to contribute to in-combination effects on this SPA.

Table 5.36: LSE Matrix for Marine Ornithological Features of the Sule Skerry and Sule Stack SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Gannet (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – gannet from this SPA may be affected by disturbance and displacement from the Proposed Development array area and its surrounds. The potential for effects of disturbance and displacement on gannet has been identified on the basis of emerging evidence concerning the large distances over which this species is displaced, although previous advice suggested that the large foraging range of this species meant that effects of such displacement are unlikely to be important (NS 2021, MSS 2021, see section 5.5.2). For gannet displacement effects are likely to be limited to the breeding season only (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

c. Collision – gannet may be vulnerable to collisions within the Proposed Development array area. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – gannet from this SPA may be affected by barrier effects from the Proposed Development array area. The potential for barrier effects on gannet has been identified on the basis of emerging evidence, although previous advice suggested that the large foraging range of this species meant that such barrier effects are unlikely to be important (NS 2020a, MSS 2020a). For gannet barrier effects are likely to be limited to the breeding season only (MSS 2020b, NS 2020c). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.5.2 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species.

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects.

Table 5.37: LSE Matrix for Marine Ornithological Features of the Fair Isle SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Gannet (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – gannet from this SPA may be affected by disturbance and displacement from the Proposed Development array area and its surrounds. The potential for effects of disturbance and displacement on gannet has been identified on the basis of emerging evidence concerning the large distances over which this species is displaced, although previous advice suggested that the large foraging range of this species meant that effects of such displacement are unlikely to be important (NS 2020a, MSS 2020a, see section 5.5.2). For gannet displacement effects are likely to be limited to the breeding season only (MSS 2020b, NS 2020c). The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

c. Collision – gannet may be vulnerable to collisions within the Proposed Development array area. Fulmar generally fly below the lower rotor swept height and is not considered vulnerable to collision effects. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – gannet from this SPA may be affected by barrier effects from the Proposed Development array area. The potential for barrier effects on gannet has been identified on the basis of emerging evidence, although previous advice suggested that the large foraging range of this species meant that such barrier effects are unlikely to be important (NS 2020a, MSS 2020a). For gannet barrier effects are likely to be limited to the breeding season only (MSS 2020b, NS 2020c). The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.5.2 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species.

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects. The exception in this regard is fulmar, for which no effect pathways to LSE are identified in relation to the Proposed Development (so that there is no potential to contribute to in-combination effects).

Table 5.38: LSE Matrix for Marine Ornithological Features of the North Rona and Sula Stack SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Gannet (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – gannet from this SPA may be affected by disturbance and displacement from the Proposed Development array area and its surrounds. The potential for effects of disturbance and displacement on gannet has been identified on the basis of emerging evidence concerning the large distances over which this species is displaced, although previous advice suggested that the large foraging range of this species meant that effects of such displacement are be important (NS 2020a, MSS 2020a, see section 5.5.2). For gannet displacement effects are likely to be limited to the breeding season only (MSS 2020, NS 2020b). The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

c. Collision – gannet may be vulnerable to collisions within the Proposed Development array area. Fulmar generally fly below the lower rotor swept height and is not considered vulnerable to collision effects. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – gannet from this SPA may be affected by barrier effects from the Proposed Development array area. The potential for barrier effects on gannet has been identified on the basis of emerging evidence, although previous advice suggested that the large foraging range of this species meant that such barrier effects are unlikely to be important (NS 2020a, MSS 2020a). For gannet barrier effects are likely to be limited to the breeding season only (MSS 2020b, NS 2020c). The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.5.2 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species.

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects. The exception in this regard is fulmar, for which no effect pathways to LSE are identified in relation to the Proposed Development (so that there is no potential to contribute to in-combination effects).

Table 5.39: LSE Matrix for Marine Ornithological Features of the Sumburgh Head SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Seabird assemblage (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

c. Collision – fulmar generally fly below the lower rotor swept height and is not considered vulnerable to collision effects. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

d: Barrier to movement – the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

e: Changes in prey availability – for fulmar this effect pathway is unlikely to be important because of the particularly large foraging range of the species (and hence extensive availability of alternative marine habitats). Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

f: In-combination effects – no effect pathways to LSE are identified in relation to the Proposed Development for any of the qualifying features which are considered to have connectivity with the Proposed Development. Therefore, it is concluded that there is no potential for the Proposed Development to contribute to in-combination effects on this SPA.

Table 5.40: LSE Matrix for Marine Ornithological Features of the Flannan Isles SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Seabird assemblage (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

c. Collision – fulmar generally fly below the lower rotor swept height and is not considered vulnerable to collision effects. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

d: Barrier to movement – the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

e: Changes in prey availability – for fulmar this effect pathway is unlikely to be important because of the particularly large foraging range of the species (and hence extensive availability of alternative marine habitats). Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

f: In-combination effects – no effect pathways to LSE are identified in relation to the Proposed Development for any of the qualifying features which are considered to have connectivity with the Proposed Development. Therefore, it is concluded that there is no potential for the Proposed Development to contribute to in-combination effects on this SPA.

Table 5.41: LSE Matrix for Marine Ornithological Features of the Foula SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Great skua (breeding)	×a	×a		×b	×b	×b		✓c			×d		×e	×e	×e	✓f	✓f	✓f
Seabird assemblage (breeding)	×a	×a		×b	×b	×b		✓c			×d		×e	×e	×e	✓f	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. For this SPA, great skua is only considered to have connectivity with Proposed Development during the non-breeding season (see section 4.4.2) and, on this basis, it is considered that disturbance and displacement from the Proposed Development array area would have minimal effects on the SPA population because of the substantial areas of alternative marine habitat available. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

c. Collision – great skua may be vulnerable to collisions within the Proposed Development array area. Fulmar generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the great skua and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. For this SPA, great skua is only considered to have connectivity with Proposed Development during the non-breeding season (see section 4.4.2) and, on this basis, it is considered that any barrier effect associated with the Proposed Development array area would be of little consequence because of the infrequent occurrence of the effect on the SPA population. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

e: Changes in prey availability – for fulmar and great skua this effect pathway is unlikely to be important because of the very extensive areas of alternative marine habitat available to these species (with the great skua SPA population having connectivity with the Proposed Development in the non-breeding season only). Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects. The exception in this regard is fulmar, for which no effect pathways to LSE are identified in relation to the Proposed Development (so that there is no potential to contribute to in-combination effects).

Table 5.42: LSE Matrix for Marine Ornithological Features of the Noss SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Gannet (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – gannet from this SPA may be affected by disturbance and displacement from the Proposed Development array area and its surrounds. The potential for effects of disturbance and displacement on gannet has been identified on the basis of emerging evidence concerning the large distances over which this species is displaced, although previous advice suggested that the large foraging range of this species meant that effects of such displacement are unlikely to be important (NS 2020a, MSS 2020a, see section 5.5.2). For gannet displacement effects are likely to be limited to the breeding season only (MSS 2020, NS 2020b). The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

c. Collision – gannet may be vulnerable to collisions within the Proposed Development array area. Fulmar generally fly below the lower rotor swept height and is not considered vulnerable to collision effects. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – gannet from this SPA may be affected by barrier effects from the Proposed Development array area. The potential for barrier effects on gannet has been identified on the basis of emerging evidence, although previous advice suggested that the large foraging range of this species meant that such barrier effects are unlikely to be important (NS 2020a, MSS 2020a). For gannet barrier effects are likely to be limited to the breeding season only (MSS 2020b, NS 2020c). The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.5.2 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species.

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects. The exception in this regard is fulmar, for which no effect pathways to LSE are identified in relation to the Proposed Development (so that there is no potential to contribute to in-combination effects).

Table 5.43: LSE Matrix for Marine Ornithological Features of the St Kilda SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Seabird assemblage (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

c. Collision – fulmar generally fly below the lower rotor swept height and is not considered vulnerable to collision effects. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

d: Barrier to movement – the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

e: Changes in prey availability – for fulmar this effect pathway is unlikely to be important because of the particularly large foraging range of the species (and hence extensive availability of alternative marine habitats). Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA (given that breeding fulmar is the only component of the seabird assemblage qualifying feature which has connectivity with the Proposed Development).

f: In-combination effects – no effect pathways to LSE are identified in relation to the Proposed Development for any of the qualifying features which are considered to have connectivity with the Proposed Development. Therefore, it is concluded that there is no potential for the Proposed Development to contribute to in-combination effects on this SPA.

Table 5.44: LSE Matrix for Marine Ornithological Features of the Fetlar SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Great skua (breeding)	×a	×a		×b	×b	×b		✓c			×d		×e	×e	×e	✓f	✓f	✓f
Seabird assemblage (breeding)	×a	×a		×b	×b	×b		✓c			×d		×e	×e	×e	✓f	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. For this SPA, great skua is only considered to have connectivity with Proposed Development during the non-breeding season (see section 4.4.2) and, on this basis, it is considered that disturbance and displacement from the Proposed Development array area would have minimal effects on the SPA population because of the substantial areas of alternative marine habitat available. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

c. Collision – great skua may be vulnerable to collisions within the Proposed Development array area. Fulmar generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the great skua and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. For this SPA, great skua is only considered to have connectivity with Proposed Development during the non-breeding season (see section 4.4.2) and, on this basis, it is considered that any barrier effect associated with the Proposed Development array area would be of little consequence because of the infrequent occurrence of the effect on the SPA population. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

e: Changes in prey availability – for fulmar and great skua this effect pathway is unlikely to be important because of the very extensive areas of alternative marine habitat available to these species (with the great skua SPA population having connectivity with the Proposed Development in the non-breeding season only). Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects. The exception in this regard is fulmar, for which no effect pathways to LSE are identified in relation to the Proposed Development (so that there is no potential to contribute to in-combination effects).

Table 5.45: LSE Matrix for Marine Ornithological Features of the Hermaness, Saxa Vord and Valla Field SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e	×f	×f	×f
Gannet (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f
Great skua (breeding)	×a	×a		×b	×b	×b		✓c			×d		×e	×e	×e	✓f	✓f	✓f
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	✓e	✓e	✓f	✓f	✓f

a: Direct habitat loss – as detailed in section 5.5.2, direct habitat loss due to the Proposed Development is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – gannet from this SPA may be affected by disturbance and displacement from the Proposed Development array area and its surrounds. The potential for effects of disturbance and displacement on gannet has been identified on the basis of emerging evidence concerning the large distances over which this species is displaced, although previous advice suggested that the large foraging range of this species meant that effects of such displacement are unlikely to be important (NS 2020a, MSS 2020a, see section 5.5.2). For gannet displacement effects are likely to be limited to the breeding season only (MSS 2020b, NS 2020c). The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Proposed Development array area are likely to be minimal. For this SPA, great skua is only considered to have connectivity with Proposed Development during the non-breeding season (see section 4.4.2) and, on this basis, it is considered that disturbance and displacement from the Proposed Development array area would have minimal effects on the SPA population because of the substantial areas of alternative marine habitat available. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

c. Collision – gannet and great skua may be vulnerable to collisions within the Proposed Development array area. Fulmar generally fly below the lower rotor swept height and is not considered vulnerable to collision effects. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet, great skua and seabird assemblage qualifying features of this SPA.

d: Barrier to movement – gannet from this SPA may be affected by barrier effects from the Proposed Development array area. The potential for barrier effects on gannet has been identified on the basis of emerging evidence, although previous advice suggested that the large foraging range of this species meant that such barrier effects are unlikely to be important (NS 2020a, MSS 2020a). For gannet barrier effects are likely to be limited to the breeding season only (MSS 2020b, NS 2020c). The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Proposed Development array area are likely to be minimal on this species. For this SPA, great skua is only considered to have connectivity with Proposed Development during the non-breeding season (see section 4.4.2) and, on this basis, it is considered that any barrier effect associated with the Proposed Development array area would be of little consequence because of the infrequent occurrence of the effect on the SPA population. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.5.2 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species. The exceptions in this regard are fulmar and great skua, for which this effect pathway is unlikely to be important because of the very extensive areas of alternative marine habitat available to these species (with the great skua SPA population having connectivity with the Proposed Development in the non-breeding season only).

f: In-combination effects – other plans or projects which have the potential to cause effects on the qualifying features of this SPA may combine with potential effects associated with the Proposed Development, so that the potential for LSE cannot be excluded in relation to in-combination effects. The exception in this regard is fulmar, for which no effect pathways to LSE are identified in relation to the Proposed Development (so that there is no potential to contribute to in-combination effects).

Table 5.46: LSE Matrix for Marine Ornithological Features of the Firth of Forth SPA and Ramsar site (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Bar-tailed godwit (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Common Scoter (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Cormorant (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Curlew (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Dunlin (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Eider (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Golden plover (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Goldeneye (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Great crested grebe (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Grey plover (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Knot (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Lapwing (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Long-tailed duck (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Mallard (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Oystercatcher (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Pink-footed goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Red-breasted merganser (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Red-throated diver (non-breeding)	×a	×a		✓ b	×b	✓ b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Redshank (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Ringed plover (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Sandwich tern (passage)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Scaup (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Shelduck (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Slavonian grebe (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Turnstone (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Velvet scoter (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Wigeon (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Waterfowl assemblage (non-breeding)	×a	×a		✓b	×b	✓b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

As detailed in section 5.5.2 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

For the migratory waterbird SPAs, the Firth of Forth SPA is the only exception in this regard. This is because this SPA is close enough to the offshore export cable corridor for there to be the potential for disturbance and displacement of the non-breeding red-throated diver qualifying feature during construction and decommissioning (see section 4.4.2). Therefore, for this qualifying feature at this SPA the potential for LSE in relation to disturbance and displacement (b) during construction and decommissioning cannot be excluded.

Table 5.47: LSE Matrix for Marine Ornithological Features of the Montrose Basin SPA and Ramsar site (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Dunlin (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Eider (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Greylag goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Knot (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Oystercatcher (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Pink-footed goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Redshank (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Shelduck (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Wigeon (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Waterfowl assemblage (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

As detailed in section 5.5.2 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.48: LSE Matrix for Marine Ornithological Features of the Northumbria Coast SPA and Ramsar site (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Purple sandpiper (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Turnstone (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

As detailed in section 5.5.2 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.49: LSE Matrix for Marine Ornithological Features of the Firth of Tay and Eden Estuary SPA and Ramsar site (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Bar-tailed godwit (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Common Scoter (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Cormorant (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Dunlin (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Eider (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Goldeneye (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Goosander (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Grey plover (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Greylag goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Icelandic black-tailed godwit (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Long-tailed duck (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Oystercatcher (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Pink-footed goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Red-breasted merganser (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Redshank (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Sanderling (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Shelduck (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Velvet scoter (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Waterfowl assemblage (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

As detailed in section 5.5.2 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.50: LSE Matrix for Marine Ornithological Features of the Lindisfarne SPA and Ramsar site (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Bar-tailed godwit (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Common scoter (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Dunlin (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Eider (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Golden plover (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Grey plover (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Greylag goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Light-bellied brent goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Long-tailed duck (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Red-breasted merganser (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Redshank (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Ringed plover (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Sanderling (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Shelduck (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Whooper swan (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Wigeon (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Waterfowl assemblage (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

As detailed in section 5.5.2 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.51: LSE Matrix for Marine Ornithological Features of the Ythan Estuary, Sands of Forvie and Meikle Loch SPA / Ythan Estuary and Meikle Loch Ramsar site (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Eider (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Lapwing (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Pink-footed goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Redshank (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Waterfowl assemblage (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

As detailed in section 5.5.2 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.52: LSE Matrix for Marine Ornithological Features of the Cameron Reservoir SPA and Ramsar site (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Pink-footed goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

As detailed in section 5.5.2 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.53: LSE Matrix for Marine Ornithological Features of the Holburn Lake and Moss SPA and Ramsar site (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Greylag goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

As detailed in section 5.5.2 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.54: LSE Matrix for Marine Ornithological Features of the Greenlaw Moor SPA and Ramsar site (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Pink-footed goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

As detailed in section 5.5.2 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.55: LSE Matrix for Marine Ornithological Features of the Loch of Kinnordy SPA and Ramsar site (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Pink-footed goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Greylag goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

As detailed in section 5.5.2 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.56: LSE Matrix for Marine Ornithological Features of the Din Moss - Hoselaw Loch SPA and Ramsar site (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Pink-footed goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Greylag goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

As detailed in section 5.5.2 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.57: LSE Matrix for Marine Ornithological Features of the Fala Flow SPA and Ramsar site (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Pink-footed goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

As detailed in section 5.5.2 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.58: LSE Matrix for Marine Ornithological Features of the Loch Leven SPA and Ramsar site (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Cormorant (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Gadwall (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Goldeneye (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Pink-footed goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Pochard (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Shoveler (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Teal (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Tufted duck (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Whooper swan (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Waterfowl assemblage (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

As detailed in section 5.5.2 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.59: LSE Matrix for Marine Ornithological Features of the Gladhouse Reservoir SPA and Ramsar site (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Pink-footed goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

As detailed in section 5.5.2 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.60: LSE Matrix for Marine Ornithological Features of the South Tayside Goose Roosts SPA and Ramsar site (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Pink-footed goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Greylag goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Wigeon (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Waterfowl assemblage (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

As detailed in section 5.5.2 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.61: LSE Matrix for Marine Ornithological Features of the Westwater SPA and Ramsar site (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Pink-footed goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f
Waterfowl assemblage (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

As detailed in section 5.5.2 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.62: LSE Matrix for Marine Ornithological Features of the Slamannan Plateau SPA (C = construction, O&M = operation and maintenance, D = decommissioning; ✓ = potential for LSE, × = no potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects		
	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D	C	O&M	D
Taiga bean goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f

As detailed in section 5.5.2 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

6. APPROACH TO THE IN-COMBINATION ASSESSMENT

317. The Habitats Regulations require the consideration of the potential effects of a project on European sites both alone and in-combination with other plans or projects.

318. The Marine Scotland Consenting and Licensing Guidance: For Offshore Wind, Wave and Tidal Energy Applications (Scottish Government, 2018) states that 'Engagement with MS-LOT is required to identify which plans/projects/ongoing activities should be included in the in-combination element of the cumulative effects assessment'. The offshore wind projects in the Firth of Forth and Tay region will be considered, alongside other developments, including those which are:

- already constructed;
- under construction;
- permitted application(s), but not yet implemented; and
- Plans and projects which are "reasonably foreseeable" (i.e. developments that are being planned, including, for example, offshore renewable energy projects which have a Crown Estate AfL, offshore renewable energy projects that have been scoped).

319. The in-combination assessment will consider all other relevant plans, projects and activities where information to inform the assessment is publicly available three months prior to the Proposed Development application.

320. The in-combination assessment will present relevant in-combination impacts of projects according to a tiered approach. This approach provides a framework for placing relative weight upon the potential for each project/plan to be included in the in-combination assessment to ultimately be realised, based upon the project/plan's current stage of maturity and certainty in the projects' parameters. The tiered approach which will be utilised within the in-combination assessment comprises the following tiers:

- tier 1 assessment – Proposed Development (offshore elements of the Berwick Bank Wind Farm) with Berwick Bank Wind Farm onshore;
- tier 2 assessment – All plans/projects assessed under Tier 1, plus projects which are operational, under construction, those with consent and submitted but not yet determined;
- tier 3 assessment – All plans/projects assessed under Tier 2, plus those projects with a Scoping Report; and
- tier 4 assessment - All plans/projects assessed under Tier 3, plus those projects likely to come forward where an AfL has been granted.

321. An overview of the projects or activities which will be considered for in-combination with the Proposed Development include:

- other offshore wind farms and associated cabling and infrastructure;
- oil and gas infrastructure/development (cables and pipelines);
- other forms of cabling (i.e. telecommunications and interlinks);
- beach replenishment schemes;
- navigation and shipping; and
- aggregate extraction and disposal of dredging spoil.

7. SUMMARY OF LSE

322. Table 7.1 provides a summary of the European sites, qualifying interest features and potential impacts for which a potential for a LSE has been identified as a result of the Proposed Development alone and/or in combination with other plans or projects. The table excludes all features which have been screened out as no potential for LSE has been identified. These sites and features will be taken forward for consideration in the RIAA.

323. In total, 12 SACs are being taken forward for consideration in the RIAA. In relation to European sites designated for Annex I Habitats, the assessment of LSE undertaken in section 5.2 considered one SAC for which the potential for LSE could not be discounted. An appropriate assessment will be undertaken for this site in the RIAA with respect to Increases in SSC and sediment deposition, changes in physical processes and in-combination effects.

324. Six SACs were considered for Annex II diadromous fish species in section 5.3. All six of these sites were progressed to stage two of the HRA with respect to underwater noise, EMF, the colonisation of hard structures and in-combination effects.

325. With respect to marine mammals, the assessment of LSE undertaken in section 5.4, considered 24 European sites (including five SACs in the UK and 19 transboundary sites). Of these, the potential for LSE could not be discounted with respect to underwater noise, changes in prey availability and in-combination effects for five SACs (two SACs for grey seal, one SAC each for harbour seal, harbour porpoise and bottle nose dolphin).

326. In relation to the SPAs (and associated Ramsar sites included on the basis of their ornithological features), the assessment of LSE undertaken in section 5.5 above, resulted in a total of 37 sites being taken forward for consideration in the RIAA. Of these 37 SPAs (and Ramsar sites), one is a marine SPA, 19 are breeding seabird colony SPAs and 17 are migratory waterbird SPAs (and Ramsar sites), with one site from the latter category (i.e. the Firth of Forth SPA and Ramsar site) also included due to the potential for LSE as a result of disturbance and displacement of the non-breeding red-throated diver qualifying feature.

Table 7.1: Summary of European Sites and Relevant Qualifying Features for Which Potential LSEs Have Been Identified and Screened in for Further Assessment in the RIAA

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
Berwickshire and North Northumberland Coast SAC	Mudflats and sandflats not covered by seawater at low tide	Construction / decommissioning	Increase in SSC and sediment deposition (ECC works only)
		Operation and maintenance	Increase in SSC and sediment deposition (ECC works only)
			Changes in physical processes (ECC works only)
	Large shallow inlets and bays	Construction / decommissioning	Increase in SSC and sediment deposition (ECC works only)
		Operation and maintenance	Increase in SSC and sediment deposition (ECC works only)
			Changes in physical processes (ECC works only)
	Reefs	Construction / decommissioning	Increase in SSC and sediment deposition (ECC works only)
			Accidental pollution
		Operation and maintenance	Increase in SSC and sediment deposition (ECC works only)
			Changes in physical processes (ECC works only)
	Submerged or partially submerged sea caves	Construction / decommissioning	Increase in SSC and sediment deposition (ECC works only)
		Operation and maintenance	Increase in SSC and sediment deposition (ECC works only)
			Changes in physical processes (ECC works only)
	Grey seal (*Halichoerus grypus*)	Construction/ decommissioning	Underwater noise from piling
			Underwater noise from clearance of UXO
			Underwater noise from pre-construction surveys
			Underwater noise from vessels and other vessel activities
			Changes in prey availability
		Operation and maintenance	Underwater noise from vessels and other vessel activities
			Changes in prey availability
Tweed Estuary SAC	Sea lamprey (*Petromyzon marinus*)	Construction / decommissioning	Underwater noise
		Operation and maintenance	EMF
			Colonisation of hard structures
	River lamprey (*Lampetra fluviatilis*)	Construction / decommissioning	Underwater noise
		Operation and maintenance	EMF
			Colonisation of hard structures
River Tweed SAC	Atlantic salmon (*Salmo salar*)	Construction / decommissioning	Underwater noise
		Operation and maintenance	EMF

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
			Colonisation of hard structures
	Sea lamprey (*Petromyzon marinus*)	Construction / decommissioning	Underwater noise
		Operation and maintenance	EMF
			Colonisation of hard structures
	River lamprey (*Lampetra fluviatilis*)	Construction / decommissioning	Underwater noise
		Operation and maintenance	EMF
			Colonisation of hard structures
River South Esk SAC	Atlantic salmon (*Salmo salar*)	Construction / decommissioning	Underwater noise
		Operation and maintenance	EMF
			Colonisation of hard structures
	Freshwater pearl mussel (*Margaritifera margaritifera*)	Construction / decommissioning	Underwater noise
		Operation and maintenance	EMF
			Colonisation of hard structures
River Tay SAC	Atlantic salmon (*Salmo salar*)	Construction / decommissioning	Underwater noise
		Operation and maintenance	EMF
			Colonisation of hard structures
	Sea lamprey (*Petromyzon marinus*)	Construction / decommissioning	Underwater noise
		Operation and maintenance	EMF
			Colonisation of hard structures
	River lamprey (*Lampetra fluviatilis*)	Construction / decommissioning	Underwater noise
		Operation and maintenance	EMF
			Colonisation of hard structures
River Dee SAC	Atlantic salmon (*Salmo salar*)	Construction / decommissioning	Underwater noise
		Operation and maintenance	EMF
			Colonisation of hard structures
	Freshwater pearl mussel (*Margaritifera margaritifera*)	Construction / decommissioning	Underwater noise
		Operation and maintenance	EMF
			Colonisation of hard structures
River Teith SAC	Atlantic salmon (*Salmo salar*)	Construction / decommissioning	Underwater noise
		Operation and maintenance	EMF
			Colonisation of hard structures
	Sea lamprey (*Petromyzon marinus*)	Construction / decommissioning	Underwater noise

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
		Operation and maintenance	EMF
			Colonisation of hard structures
	River lamprey (*Lampetra fluviatilis*)	Construction / decommissioning	Underwater noise
		Operation and maintenance	EMF
			Colonisation of hard structures
Isle of May SAC	Grey seal (*Halichoerus grypus*)	Construction / decommissioning	Underwater noise from piling
			Underwater noise from clearance of UXO
			Underwater noise from pre-construction surveys
			Underwater noise from vessels and other vessel activities
			Changes in prey availability
		Operation and maintenance	Underwater noise from vessels and other vessel activities
			Changes in prey availability
Firth of Tay and Eden Estuary SAC	Harbour seal (*Phoca vitulina*)	Construction / decommissioning	Underwater noise from piling
			Underwater noise from clearance of UXO
			Underwater noise from pre-construction surveys
			Underwater noise from vessels and other vessel activities
			Changes in prey availability
		Operation and maintenance	Underwater noise from vessels and other vessel activities
			Changes in prey availability
Southern North Sea SAC	Harbour porpoise (*Phocoena phocoena*)	Construction / decommissioning	Underwater noise from piling
			Underwater noise from clearance of UXO
			Underwater noise from pre-construction surveys
			Changes in prey availability
		Operation and maintenance	Changes in prey availability
Moray Firth SAC	Bottlenose dolphin (*Tursiops truncatus*)	Construction / decommissioning	Underwater noise from piling
			Underwater noise from clearance of UXO
			Underwater noise from pre-construction surveys
			Changes in prey availability
		Operation and maintenance	Changes in prey availability
Seabird Sites			
Outer Firth of Forth and St Andrew's Bay Complex pSPA	Gannet *Morus bassanus* (breeding)	Construction	Changes in prey availability
		Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Accidental pollution

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
	Guillemot *Uria aalge* (breeding and non-breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Herring gull *Larus argentatus* (breeding and non-breeding)	Construction	Changes in prey availability
		Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Accidental pollution
	Kittiwake *Rissa tridactyla* (breeding and non-breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
	Puffin *Fratercula arctica* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Razorbill *Alca torda* (non-breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Seabird assemblage (breeding and non-breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
	Arctic tern *Sterna paradisaea* (breeding)	Construction / decommissioning	Accidental pollution
	Common tern *Sterna hirundo* (breeding) Black-headed gull *Chroicocephalus ridibundus* (non-breeding) Common gull *Larus canus* (non-breeding)	Operation and maintenance	Accidental pollution
	Little gull *Hydrocoloeus minutus* (non-breeding) Common scoter *Melanitta nigra* (non-breeding) Eider *Somateria mollissima* (non-breeding) Goldeneye *Bucephala clangula* (non-breeding) Long-tailed duck *Clangula hyemalis* (non-breeding) Red-breasted merganser *Mergus serrator* (non-breeding) Red-throated diver *Gavia stellata* (non-breeding) Slavonian grebe *Podiceps auritus* (non-breeding) Velvet scoter *Melanitta fusca* (non-breeding) Waterfowl assemblage (non-breeding)		
St Abb's Head to Fast Castle SPA	Guillemot *Uria aalge* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Razorbill *Alca torda* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Herring gull *Larus argentatus* (breeding)	Construction	Changes in prey availability
		Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Accidental pollution
	Kittiwake *Rissa tridactyla*	Construction / decommissioning	Disturbance / displacement
			Accidental pollution

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
	(breeding)	Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
	Seabird assemblage (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
Northumberland Marine SPA	Arctic tern *Sterna paradisea* (Breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
	Guillemot *Uria aalge* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Puffin *Fratercula arctica* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Seabird assemblage (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
Farne Islands SPA	Guillemot *Uria aalge* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Seabird assemblage (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
			Barrier to movement
			Accidental pollution
Forth Islands SPA	Gannet *Morus bassanus* (breeding)	Construction	Changes in prey availability
		Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Accidental pollution
	Herring gull *Larus argentatus* (breeding)	Construction	Changes in prey availability
		Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Accidental pollution
	Lesser black-backed gull *Larus fuscus* (breeding)	Construction	Changes in prey availability
		Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Accidental pollution
	Guillemot *Uria aalge* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Puffin *Fratercula arctica* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Razorbill *Alca torda* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Kittiwake *Rissa tridactyla* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
	Seabird assemblage (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
			Accidental pollution
Fowlsheugh SPA	Fulmar *Fulmarus glacialis* (breeding)	Construction / decommissioning	Accidental pollution
	Guillemot *Uria aalge* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Razorbill *Alca torda* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Kittiwake *Rissa tridactyla* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
	Herring gull *Larus argentatus* (breeding)	Construction	Changes in prey availability
		Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Accidental pollution
	Seabird assemblage (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
Buchan Ness to Collieston Coast SPA	Fulmar *Fulmarus glacialis* (breeding)	Construction / decommissioning	Accidental pollution
	Guillemot *Uria aalge* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Kittiwake *Rissa tridactyla* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
			Accidental pollution
	Seabird assemblage (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
Troup, Pennan and Lion's Heads SPA	Fulmar *Fulmarus glacialis* (breeding)	Construction / decommissioning	Accidental pollution
	Guillemot *Uria aalge* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Razorbill *Alca torda* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Kittiwake *Rissa tridactyla* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
	Seabird assemblage (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
East Caithness Cliffs SPA	Fulmar *Fulmarus glacialis* (breeding)	Construction / decommissioning	Accidental pollution
	Kittiwake *Rissa tridactyla* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
	Seabird assemblage (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
Flamborough and Filey Coast SPA	Gannet *Morus bassanus* (breeding)	Construction	Changes in prey availability
		Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Accidental pollution
	Kittiwake *Rissa tridactyla* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
	Seabird assemblage (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
North Caithness Cliffs SPA	Fulmar *Fulmarus glacialis* (breeding)	Construction / decommissioning	Accidental pollution
	Kittiwake *Rissa tridactyla* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
	Puffin *Fratercula arctica* (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Seabird assemblage (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
Migratory Waterbird Sites (Estuarine)			
		Construction / decommissioning	Accidental pollution

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
Firth of Forth SPA and Ramsar site	Bar-tailed godwit *Limosa lapponica* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Common Scoter *Melanitta nigra* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Cormorant *Phalacrocorax carbo* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Curlew *Numenius arquata* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Dunlin *Calidris alpina alpina* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Eider *Somateria mollissima* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Golden plover *Pluvialis apricaria* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Goldeneye *Bucephala clangula* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Great crested grebe *Podiceps cristatus* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Grey plover *Pluvialis squatarola* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
	Knot *Calidris canutus* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Lapwing *Vanellus vanellus* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Long-tailed duck *Clangula hyemalis* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Mallard *Anas platyrhynchos* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Oystercatcher *Haematopus ostralegus* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Pink-footed goose *Anser brachyrhynchus* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Red-breasted merganser *Mergus serrator* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Red-throated diver *Gavia stellata* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Redshank *Tringa totanus* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Ringed plover *Charadrius hiaticula* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Sandwich tern *Sterna sandvicensis* (passage)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Scaup *Aythya marila* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Shelduck *Tadorna tadorna* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Slavonian grebe *Podiceps auritus* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Turnstone *Arenaria interpres* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Velvet scoter *Melanitta fusca* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Waterfowl assemblage (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
	Wigeon *Anas penelope* (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
			Accidental pollution
Montrose Basin SPA and Ramsar site	Dunlin *Calidris alpina alpina* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Eider *Somateria mollissima* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
		Operation and maintenance	Collision

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
	Greylag goose *Anser anser* (non-breeding)		Barrier to movement
	Knot *Calidris canutus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Oystercatcher *Haematopus ostralegus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Pink-footed goose *Anser brachyrhynchus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Redshank *Tringa totanus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Shelduck *Tadorna tadorna* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Waterfowl assemblage (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Wigeon *Anas penelope* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
Firth of Tay and Eden Estuary SPA and Ramsar site	Bar-tailed godwit *Limosa lapponica* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Common Scoter *Melanitta nigra* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Cormorant *Phalacrocorax carbo* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Dunlin *Calidris alpina alpina* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Eider *Somateria mollissima* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Goldeneye *Bucephala clangula* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Goosander *Mergus merganser* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Grey plover *Pluvialis squatarola* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Greylag goose *Anser anser* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
		Operation and maintenance	Collision
	Icelandic black-tailed godwit *Limosa limosa islandica* (non-breeding)		Barrier to movement
	Long-tailed duck *Clangula hyemalis* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Oystercatcher *Haematopus ostralegus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Pink-footed goose *Anser brachyrhynchus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Red-breasted merganser *Mergus serrator* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Redshank *Tringa totanus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Sanderling *Calidris alba* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Shelduck *Tadorna tadorna* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Velvet scoter *Melanitta fusca* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Waterfowl assemblage (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
Ythan Estuary, Sands of Forvie and Meikle Loch SPA and Ramsar site	Eider *Somateria mollissima* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Lapwing *Vanellus vanellus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Pink-footed goose *Anser brachyrhynchus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Redshank *Tringa totanus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Waterfowl assemblage (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
Migratory Waterbird Sites (Inland Waterbodies)			
		Operation and maintenance	Collision

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
Greenlaw Moor SPA and Ramsar site	Pink-footed goose *Anser brachyrhynchus* (non-breeding)		Barrier to movement
Cameron Reservoir SPA and Ramsar site	Pink-footed goose *Anser brachyrhynchus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
Din Moss – Hoselaw Loch SPA and Ramsar site	Greylag goose *Anser anser* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Pink-footed goose *Anser brachyrhynchus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
Fala Flow SPA and Ramsar site	Pink-footed goose *Anser brachyrhynchus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
Loch of Kinnordy SPA and Ramsar site	Greylag goose *Anser anser* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Pink-footed goose *Anser brachyrhynchus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
Gladhouse Reservoir SPA and Ramsar site	Pink-footed goose *Anser brachyrhynchus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
Loch Leven SPA and Ramsar site	Cormorant *Phalacrocorax carbo* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Gadwall *Anas strepera* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Goldeneye *Bucephala clangula* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Pink-footed goose *Anser brachyrhynchus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Pochard *Aythya ferina* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Shoveler *Anas clypeata* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Teal *Anas crecca* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Tufted duck *Aythya fuligula* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Waterfowl assemblage (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Whooper swan *Cygnus cygnus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
South Tayside Goose Roosts SPA and Ramsar site	Greylag goose *Anser anser* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Pink-footed goose *Anser brachyrhynchus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Waterfowl assemblage (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
Westwater SPA and Ramsar site	Pink-footed goose *Anser brachyrhynchus* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
	Waterfowl assemblage (non-breeding)	Operation and maintenance	Collision
			Barrier to movement
Slamannan Plateau SPA	Taiga bean goose *Anser fabalis fabalis* (non-breeding)	Operation and maintenance	Collision
			Barrier to movement

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Appendix 1 Standard Data Forms

Appendix 2 Baseline Seal Information for the FTOWDG Area

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