

BERWICK BANK WIND FARM HABITATS REGULATIONS APPRAISAL (HRA)

STAGE 1 SCREENING REPORT

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GLOSSARY

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), whose conservation requires the designation of Special Areas of Conservation (SAC).
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), whose conservation requires the designation of Special Areas of Conservation (SPA).
Competent Authority	The term derives from the Habitats Regulations and relates to the duties which the Regulations impose on public bodies and individuals. Regulation 6(1) defines competent authorities as "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).
European site	A Special Area of Conservation (SAC), possible SAC (pSAC), or candidate SAC, (cSAC), a Special Protection Area (SPA) or potential SPA (pSPA), a site listed as a site of community importance (SCI), or, as per UK policy, a Ramsar site.
Firth of Forth Zone	Suitable areas for the development of offshore wind 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).
Habitat Regulations Appraisal	The process, in Scotland, required by Article 6(3) of the Habitats Directive of identifying likely significant effects and (where likely significant effects are predicted or cannot be discounted) assessing if the integrity of a European (or Ramsar) site would be adversely affected.
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.
Natura 2000 network	A coherent European ecological network of Special Areas of Conservation and Special Protection Areas.
Phase 1 Proposed Development	Development of two offshore wind farms: Seagreen Alpha and Seagreen Bravo. All offshore infrastructure of the Berwick Bank Wind Farm, seaward of Mean High Water Springs (MHWS).
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 under the European Union (EU) Habitat's Directive to help conserve certain plant and animals species listed in the Directive (SNH, 2014). Article 3 of the Habitats Directive requires the establishment of a European network of important high-quality conservation sites that will make a significant contribution to conserving the 189 habitat types and 788 species identified in Annexes I and II of the Directive (as amended). The listed habitat types and species are those considered to be most in need of conservation at a European level (excluding birds).
Site of Community	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

Term	Description
Importance (SCI)	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 classified under the EU Birds Directive to protect rare or vulnerable birds (as listed on Annex I of the Directive), as well as regularly occurring migratory species (SNH, 2014).

ACRONYMS

Acronym	Description
AC	Alternating Current
AfL	Agreement for Lease
CES	Crown Estate Scotland
cSAC	Candidate Special Area of Conservation
CTV	Crew Transfer Vessel
DC	Direct Current
EEA	European Economic Area
EIA	Environmental Impact Assessment
FTOWDG	Forth and Tay Offshore Wind Developers Group
HAT	Highest Astronomical Tide
HDD	Horizontal Directional Drilling
HLV	Heavy Lift Vessel
HRA	Habitat Regulations Appraisal
HV	High Voltage
IMO	International Maritime Organization
INIS	Invasive Non-Indigenous Species
IROPI	Imperative Reasons of Overriding Public Interest
LAT	Lowest Astronomical Tide
LNR	Local Nature Reserve
LSE	Likely Significant Effect
MARPOL	The International Convention for the Prevention of Pollution from Ships
MHWS	Mean High Water Springs
MS-LOT	Marine Scotland Licensing Operations Team
MSS	Marine Scotland Science
MU	Management Unit
NHZ	Natural Heritage Zone
NSIP	Nationally Significant Infrastructure Projects
NS	NatureScot
OSP	Offshore Substation Platform
OSPAR	Oslo-Paris
PDE	Project Design Envelope
PEMMP	Project Environmental Management and Monitoring Plan
PTS	Permanent Threshold Shift
pSAC	Possible Special Areas of Conservation
pSPA	Potential Special Protection Areas
RIAA	Report to Inform Appropriate Assessment
ROV	Remotely Operated Vehicle
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SCI	Site of Community Importance
SD	Standard Deviation
SMA	Seal Management Area
SMP	Seabird Monitoring Programme
SNH	Scottish Natural Heritage
SOV	Service Operations Vessel
SPA	Special Protection Area
SSC	Suspended Sediment Concentrations
TCE	The Crown Estate
TLP	Tensioned-leg Platform
TP	Transition Piece
UK	United Kingdom
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. Berwick Bank Wind Limited (BBW) is a wholly owned subsidiary of SSE Renewables Developments (UK) Limited (“SSE Renewables”). BBW (hereafter referred to as the Applicant) is proposing the development of the Berwick Bank Wind Farm (hereafter referred to as the Project). The Project includes both the offshore and onshore infrastructure required to generate and transmit electricity from the Proposed Development array area to a Scottish Power Transmission (SPT) 400kV Grid Substation located at Branxton, southeast of Torness Power station. The Proposed Development array area is located in the outer Firth of Forth and Firth of Tay, 39.2 km east of the East Lothian coastline from the nearest boundary and is the second project to be developed in the former Firth of Forth Zone.
2. The Applicant intends to 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. An Offshore Scoping Report has considered all of the offshore infrastructure of the Project, seaward of MHWS. The offshore components of the Project are hereafter referred to as the Proposed Development.
3. As the Proposed Development is a generating station with a capacity of greater than 1 MW, it requires the following consents, licences and permissions:
 - a Section 36 consent under the Electricity Act 1989;
 - a marine licence under the Marine and Coastal Access Act (MCAA) 2009;
 - a marine licence under the Marine (Scotland) Act 2010 for the part of the offshore export cable which is within 12 nm of the coast; and
 - planning permission under the Town and Country Planning (Scotland) Act 1997 for all Project infrastructure located landward of MLWS.
4. This document has been produced to inform the Habitat Regulations Appraisal (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 European sites of nature conservation importance. 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. Designated 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 designated sites will be “screened in” and assessed further. Potential impacts of onshore components of the Project on onshore sites landward of MHWS, are outside the scope of this LSE Screening report.
5. In Scottish territorial waters, the Habitats Directive is 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 (together the ‘Habitats Regulations’). The Conservation of Offshore Marine Habitats and Species Regulations 2017 also apply in Scottish waters more than 12 nautical miles (nm) from land. The Habitats Regulations require that an HRA must be carried out on all plans and projects that have the potential to impact upon sites designated for supporting habitats or species of international importance, otherwise known as Natura 2000 or European designated sites.

6. European sites considered within this LSE screening are defined as Special Areas of Conservation (SACs), possible SACs (pSACs¹), candidate SACs (cSACs²), Sites of Community Importance (SCI), Special Protection Areas (SPAs) and potential SPAs (pSPAs). In the United Kingdom (UK), the requirements of the Habitats Regulations are also extended to consider the effects on Ramsar sites (listed under the Ramsar Convention on Wetlands of International Importance).
7. The European Commission's (2001) guidance, identifies a staged process to the assessment of the effects of plans or projects on European sites:
 - i. Screening;
 - ii. Appropriate Assessment;
 - iii. Mitigation and alternatives; and
 - iv. Imperative Reasons of Overriding Public Interest (IROPI).
8. The guidance on conducting HRAs in Scotland (SNH, 2014) 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. What is the plan or project?
 2. Is the plan or project directly connected with or necessary to site management for nature conservation?
 3. Is the plan or project (either alone or in combination with other plans or projects) likely to have a significant effect on the site?
 4. Undertake an appropriate assessment of the implications for the site in view of its conservation objectives.
 5. Can it be ascertained that the proposal will not adversely affect the integrity of the site?
 6. Are there alternative solutions?
 7. Would a priority habitat or species be adversely affected?
 8. Are there imperative reasons of overriding public interest (IROPI) for non-priority habitats and species?
 9. Are there IROPI for priority habitats and species?
9. In Scotland, Stages 1 to 3 are the LSE screening stage identified by the European Commission guidance (EC, 2001), Stages 4 and 5 the appropriate assessment, Stages 6 and 7 the mitigation and alternatives step and Stages 8 to 9 are the IROPI stages. The first five stages are cumulatively referred to as an HRA and Stages 6 to 9 are only considered in exceptional circumstances.

1.2. PURPOSE OF THIS REPORT

10. This document represents the LSE Screening required by regulation 48 of the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and as outlined above in section 1.1, for the Proposed Development (as described in section 3) and Regulation 63 (1-2) of the Conservation of Habitats and Species Regulations 2017. 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 of nature conservation importance. LSE is, in this context, any effect that may be reasonably predicted as a consequence of a project that may affect the conservation objectives of the features for which the European site was designated, excluding trivial or inconsequential effects. It is important

¹ A site which has been identified and approved to go out to formal consultation.

² Following consultation on the pSAC, the site is submitted to the European Commission (EC) for designation and at this stage it is called a cSAC.

to note that this is different from Likely Significant Effect used in the context of the Environmental Impact Assessment Directive and related EIA Regulations.

11. 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. Potential impacts of onshore components of the Project on onshore sites landward of MHWS, are outside the scope of this LSE Screening report. A separate EIA and Report to Inform Appropriate Assessment (RIAA) will be produced covering impacts of onshore infrastructure on onshore sites. It should also be noted that a separate LSE Screening report will be provided for the Marr Bank Wind Farm and this LSE Screening report considers Berwick Bank Wind Farm only.
12. The screening assessment 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 environmental surveys, EIA assessment work, consultee responses to this document and/or refinements to the design of the Proposed Development will be reflected in the full RIAA.
13. In summary, the purpose of this report is:
 - to identify the relevant European sites which may include features (Annex I habitats and Annex II species) 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 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 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.

1.3. STRUCTURE OF THIS REPORT

14. This LSE screening report is set out in the following stages:
 - section 2 – a brief summary of the HRA process and legislative context;
 - 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
 - section 6 – a summary of the European sites and features for which the screening process has identified potential for LSEs.

1.4. PROJECT OVERVIEW

1.4.1. FIRTH OF FORTH ZONE

15. 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 the Department of Energy and Climate Change (DECC), now the Department for Business, Energy and Industrial Strategy (BEIS). As part of a competitive tender, Seagreen Wind Energy Limited 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 established a target generation capacity of 3,465 megawatts (MW) within the Zone, which is to be met through 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 1 (consisting of Seagreen Alpha and Seagreen Bravo), Berwick Bank and Marr Bank.

1.4.2. PHASE 1

16. 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.
17. 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.

1.4.3. PHASE 2

18. Phase 2 of the former Firth of Forth Zone includes Berwick Bank Wind Farm (the Project), which will have an approximate installed capacity of 2,300 MW, and Marr Bank Wind Farm, which will have an approximate installed capacity of 1,850 MW (see Figure 1.1).
19. The Project will include both the offshore wind turbine generators (hereafter referred to as wind turbines) and associated offshore infrastructure, as well as onshore grid connection and associated infrastructure.
20. The Proposed Development array area, which is located approximately 5 km south of Seagreen 1, is approximately 775 km², and is located to the east of Marr Bank, and overlapping Berwick Bank in the south (see Figure 1.1).
21. The Project, including both offshore and onshore components, was selected following both engineering and environmental considerations.

1.4.4. THE PROPOSED DEVELOPMENT

Introduction

22. The Proposed Development will have an approximate installed capacity of 2,300 MW and will include up to 242 wind turbines and all associated offshore and onshore infrastructure, although as outlined in section 1.1, this LSE Screening considers only the offshore

components (up to MHWS) of the Proposed Development (including onshore impacts of offshore infrastructure).

23. The Proposed Development has a confirmed grid connection at Branxton and will make landfall near Torness, on the East Lothian coast. The Applicant is currently assessing the feasibility of two potential landfall locations on the East Lothian coast, one at Thorntonloch (hereafter referred to as the 'Thorntonloch Landfall') and one at Skateraw (hereafter referred to as the 'Skateraw Landfall'; see Figure 1.1).
24. The electricity generated from the Proposed Development will be transmitted via buried High Voltage (HV) cables using either Direct Current (DC) or Alternating Current (AC). The offshore export cables will have a maximum total length of 800 km, comprised of up to ten cables.
25. The Applicant has a 50-year AfL agreement with CES. The Applicant is seeking a 50-year consent period to allow the wind farm to continue operating should the lifespan of the wind turbines allow. If, in the future, the Applicant sought to repower the wind farm then they would do so through the submission of an application to cover any proposed new development.

Key Components of the Proposed Development

26. The key offshore components of the Proposed Development include:
 - wind turbines;
 - wind turbine foundations;
 - array cables;
 - interconnection cables;
 - offshore platform(s); and
 - offshore export cable/s.
27. Further description of the key elements of the Proposed Development is provided in section 3.

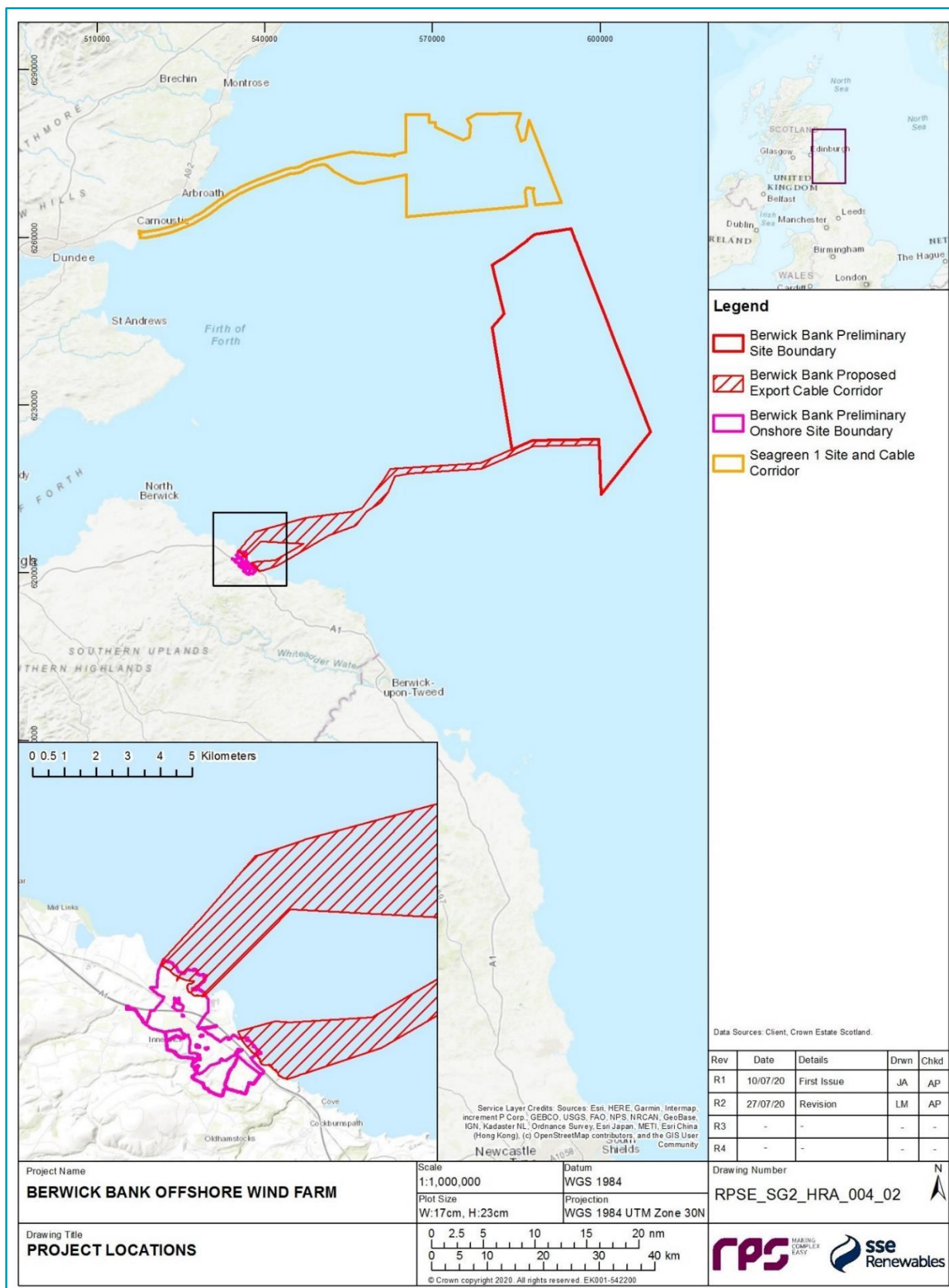


Figure 1.1: Location of the Proposed Development within the Former Firth of Forth Zone

1.5. RELEVANT CONSULTATIONS

28. Early consultation on this LSE Screening for the Proposed Development has been 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)); a summary of the details of this consultation is presented in Table 1.1.

Table 1.1: Summary of Consultation on LSE Screening for the Proposed Development

Date	Consultee	Type of Consultation	Summary of Consultation
18 December 2019	Marine Scotland, SNH	Teleconference	Advised that revised guidance relating to foraging ranges for breeding seabirds was due to be published (Woodward <i>et al.</i> , 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 <i>et al.</i> (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. The Applicant 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 to consider larger gulls in the assessment as well as five key species: gannet, kittiwake, guillemot, razorbill and puffin.
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. MSS raised queries regarding which SACs will be included for Atlantic salmon and highlighted that consideration also needs to be given to rivers across the Proposed Development boundary, including the River Tweed SAC.

Date	Consultee	Type of Consultation	Summary of Consultation
15 July 2020	MS-LOT, MSS, SNH	Letter response to proposed benthic survey specification	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. 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.

2. HABITAT REGULATIONS PROCESS

2.1. LEGISLATIVE CONTEXT

29. 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 Habitats Directive establishes a network of internationally important sites, designated for their ecological status. SACs are designated under the Habitats Directive and promote the protection of flora, fauna and habitats. SPAs are designated under the Birds Directive in order to protect rare, vulnerable and migratory birds. These sites combine to create a Europe-wide Natura 2000 network of designated sites, which are hereafter referred to as European sites.
30. For Scottish territorial waters out to 12 nm, these Directives are transposed into law by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and the Conservation of Habitats and Species Regulations 2017 in respect of reserved matters (hereafter referred to as the Habitats Regulations). For waters beyond 12 nm to the edge of the UK continental shelf, the Conservation of Offshore Marine Habitats and Species Regulations 2017 transpose the Habitats and Birds Directives into national law in the UK.
31. In addition to sites designated under European legislation, Scottish Government policy (Scottish Government, 2018; SNH, 2014) states that internationally important wetlands designated under the Ramsar Convention 1971 (Ramsar sites) should be afforded the same level of protection as sites designated under the Habitats Directive. As a matter of policy (Scottish Government, 2018), the Scottish Government also affords sites going through the formal designation process (i.e. pSPAs, cSACs and pSACs), SCIs and potential Ramsar sites the same level of protection. Commonly, all sites are referred to as European sites.
32. Under the Habitats Regulations, before granting approval (i.e. planning permissions, licenses and consents) for a development likely to have a significant effect on an SAC or SPA/Ramsar site, an appropriate assessment must be made by the Competent Authority, of the proposed plan or project's potential implications for the site in view of that site's conservation objectives.
33. The Competent Authority for the Proposed Development will be Scottish Ministers.

2.2. THE PROCESS

34. Regulation 48 of the Habitats Regulations 1994 (as amended) requires that, wherever a plan or project that is not directly connected to, or necessary for, the management of a Natura 2000 site is likely to have a significant effect on the conservation objectives of the site (either alone or in-combination with other plans or projects), the competent authority must undertake an 'appropriate assessment' of the implications for the site in view of the site's conservation objectives before consent or authorisation can be given for the plan or project.
35. Regulation 48 states that the competent authority may agree to the plan or project only after it has determined that it will not adversely affect the integrity of the European site. If an appropriate assessment concludes that the development will adversely affect the integrity of the site, Regulation 49 makes clear that consent/authorisation can only then be given if there are no alternative solutions and that the project must be carried out for Imperative Reasons of Overriding Public Interest (IROPI). Where the site supports priority natural habitats or priority species, the IROPI must be in relation to reasons: i) relating to human health, public safety or beneficial consequences of primary importance to the environment, or ii) other reasons which in the opinion of the European Commission are IROPI. Agreement under

these circumstances must be accompanied by the securing of necessary compensatory measures to ensure that the overall coherence of the network of European sites is protected.

36. Regulation 48 makes 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 RIAA provides this information.
37. In order to determine whether an appropriate assessment is required it must first be ascertained whether or not the plan/project is clearly necessary to, or of value to, or inevitable as part of, management of the site for its qualifying interests. 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 the European site. This constitutes the LSE screening stage which removes from the assessment process plans or projects which clearly have no connectivity to a site's qualifying interests or those where it is very obvious that the conservation objectives for the site's qualifying interests will not be undermined despite a connection. All other plans or projects, including those where there is reasonable doubt as to the magnitude and nature of their impact, are passed through to the next stage (appropriate assessment).
38. The Habitats Regulations set out a step-by-step sequence of statutory procedures to be followed which are designed to test the potential effects of plans and projects on European sites. It must be followed in the correct and particular sequence in order to comply with the requirements of the Directive. As discussed in section 1.1, the guidance on conducting HRAs in Scotland (SNH, 2014) outlines nine stages that assessments of the effects of plans or projects on European sites must follow. These stages are summarised in Figure 2.1. The first five stages of the process are referred to as the HRA to clearly distinguish the whole process from the one step within it referred to as the "appropriate assessment".
39. This report considers the first 'screening for LSE' step in the HRA process which encompasses stages 1 to 3 in Figure 2.1.

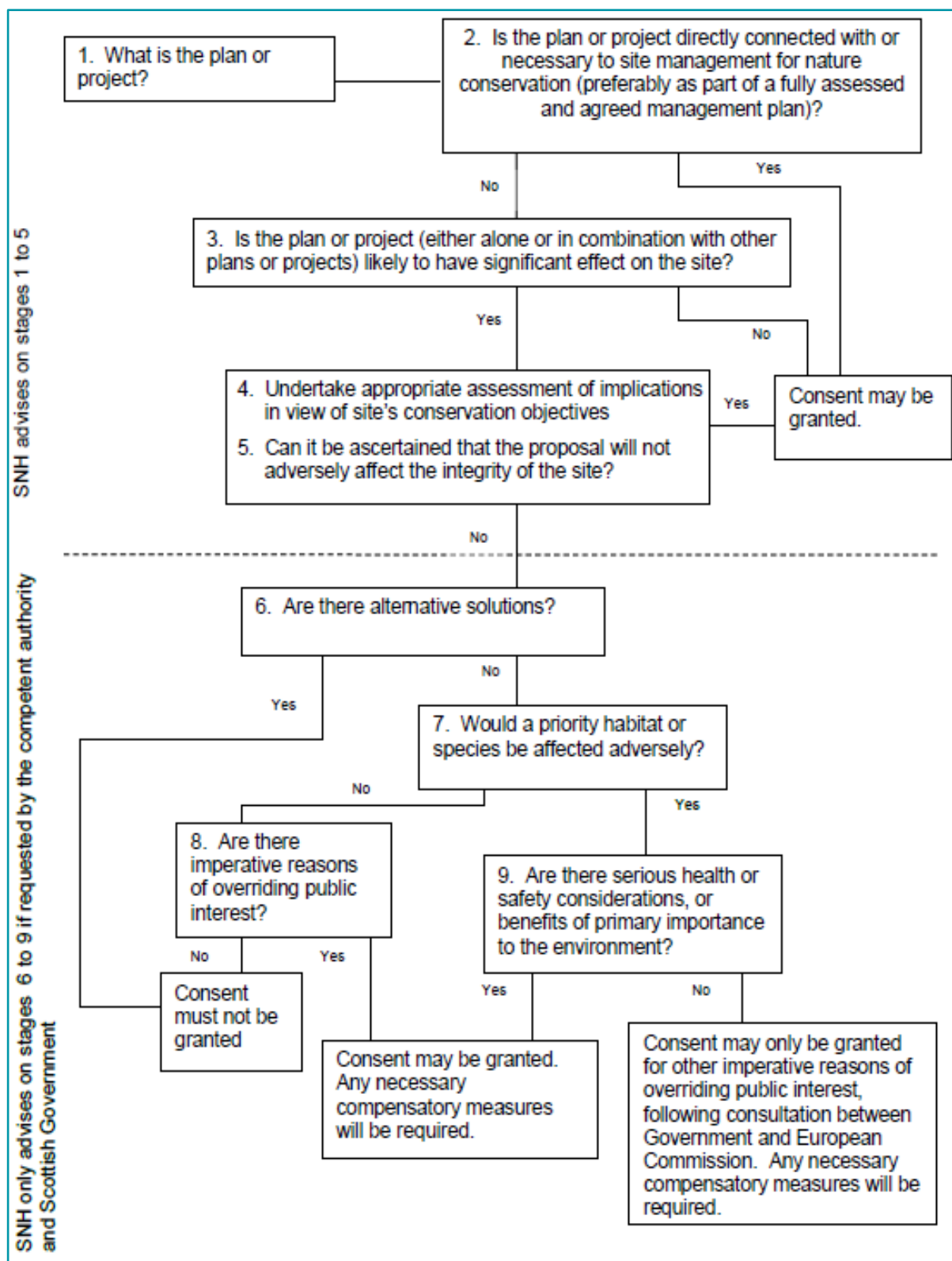


Figure 2.1: Nine Stages of How to Consider Plans and Projects that could Affect European Sites (taken from SNH, 2014)

2.3. PROCESS FOR IDENTIFYING EUROPEAN SITES AND FEATURES

40. 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.
41. 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.
42. 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. 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. 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. For ornithology receptors, all species recorded on less than 10 occasions within the site-specific surveys are excluded from inclusion in the criterion (see section 4.3).

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).

43. 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

44. This section of the Berwick Bank LSE Screening Report sets out the indicative design of the Proposed Development and the offshore components required for the offshore infrastructure. This section also details the activities likely to be associated with the construction, operation and maintenance, and decommissioning of the Proposed Development. 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 best 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.
45. The Proposed Development is located 39.2 km offshore, east of the East Lothian coastline in Scotland and located within the south eastern extent the former Firth of Forth Zone. The Proposed Development array area comprises an area of approximately 775 km² located to the east of Marr Bank, and overlapping Berwick Bank in the south.
46. The Applicant is currently assessing the feasibility of two potential landfall locations on the East Lothian coast, one at Thorntonloch and one at Skateraw. Both cable landfalls may be utilised. A grid connection point has been confirmed at Branxton, south west of Torness Power station with an existing grid connection agreement for 2.3 gigawatts (GW). A potential offshore export cable corridor has also been identified as shown in Figure 1.1.

3.2. PROPOSED BOUNDARY

47. An Agreement for Lease (AfL) allows the Applicant 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. As discussed in section 3.1, the detailed design cannot be proposed at this stage, however further information on the site will inform the refinement of the Design Envelope.
48. The AfL area for the Proposed Development covers approximately 775 km² and is located approximately 39.2 km offshore at its closest distance to shore. This area is where the offshore infrastructure, such as the wind turbines, offshore substation(s) and array cables, will be located. This area is hereafter referred to as the Proposed Development array area.
49. The Proposed Development offshore export cable corridor has been identified and will connect the Proposed Development array area to the Thorntonloch Landfall or Skateraw Landfall, or both.
50. The Proposed Development boundary is illustrated within Figure 1.1. This area encompasses the:
 - Proposed Development 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
 - Proposed Development offshore export cable corridor: This is where the permanent offshore electrical infrastructure (offshore export cable(s)) will be located.

3.3. OFFSHORE INFRASTRUCTURE

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

- up to 242 wind turbines (each comprising a tower section, nacelle and three rotor blades) and associated foundations;
- up to ten Offshore Substation Platforms (OSPs) and associated support structures and foundations;
- scour protection of up to 2,280,000 m³;
- a network of inter-array cabling linking the individual wind turbines to the offshore substation, end links plus inter-connector cables between substations (approximately 1,036 km of array cabling); and
- up to ten offshore export cables connecting the offshore substation(s) to the onshore substation.

3.3.1. WIND TURBINES

52. The Proposed Development will be comprised of up to 242 wind turbines, and the final number of wind turbines will be dependent on the capacity of individual wind turbines used. 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.
53. The maximum rotor blade diameter is expected to be no greater than 270 m, with a maximum blade tip height of 310 m above Lowest Astronomical Tide (LAT) and a minimum blade tip height of 186 m above LAT. The top of the wind turbines (the nacelle) will be approximately 175 m above LAT. A scheme for wind turbine lighting and navigation marking will be agreed with consultees. The minimum distance between the bottom of the blade and the water surface will be between 22 – 40 m.
54. The wind turbine layout 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 decided at the final design stage.
55. The maximum adverse design envelope 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	242
Maximum rotor blade diameter (m)	270
Maximum nacelle height (m above LAT)	175
Minimum height of lowest blade tip above LAT (m)	186
Maximum blade tip height above LAT (m)	310

3.3.2. WIND TURBINE FOUNDATIONS AND SUPPORT STRUCTURES

56. The wind turbines will be fixed to the seabed by foundation structures. To allow for flexibility in foundation choice, several wind turbine support structures and foundations are being considered for the Proposed Development including monopiles, suction bucket jacket foundations, piled jacket foundations, gravity base structures and floating foundations. Floating foundations are only being considered as a demonstrator. The final selection will depend on factors including wind turbine type, soil conditions, water depth, wave, wind and tidal conditions, Applicant economics and procurement approach.
57. There is the potential for seabed preparation to be required prior to gravity base foundation installation, which may include seabed levelling and removing surface and subsurface debris such as (for example) boulders, fishing nets or lost anchors. Excavation may be required to access and remove any debris which is present below the seabed surface.

58. 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.
59. All foundation types and maximum parameters stated in the following section are for wind turbines only.

Monopile Foundations

60. Monopile foundations typically consist of a single steel tubular section and a transition piece (TP) which may include boat landing features, ladders, a crane, and other ancillary offshore components as well as a flange for connection to the wind turbine tower.
61. In most instances, monopiles are driven into the seabed from either a floating vessel or a jack-up barge using hydraulic hammers which are available in various capacities for operation either above or under the water surface. In areas of hard soil or bedrock close to the seabed surface, where piling with a hammer is difficult or impossible, drilling may be used to assist piling. Drilling operations produce spoil which is typically disposed of at the drill site.
62. During the construction phase of the Proposed Development, multiple installation vessels may be in operation at any one time, operating over a 24-hour period, to support up to two simultaneous piling operations. The installation of a single monopile foundation may take up to three days allowing for vessel re-positioning and commissioning at each installation location, although continuous piling itself will be completed over a period of hours rather than days. Piling usually commences with low hammer energies ('soft start') and maximum hammer energies (if required) are attained after a predefined 'ramp up' and typically only used where ground conditions require.
63. The maximum adverse design scenario for monopile foundations is shown in Table 3.2.

Table 3.2: Design Envelope for Monopile Foundations

Parameter	Maximum Design Envelope
Number of monopiles	242
Diameter (m)	15
Realistic maximum hammer energy (kilojoule (kJ))	6,000 ³
Diameter of foundation footprint (largest single foundation) (m) including scour protection	60
Number of simultaneous piling events	2
Cumulative wind farm area of foundation footprint (greater number of smaller structures) (m ²)	194,628
Piling duration (per monopile) (hrs)	TBC

Piled Jacket Foundations

64. Piled jacket foundations can be used to support wind turbines and 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, drilled or vibrated into the seabed relying on the frictional and end bearing properties of the seabed for support. Unlike monopiles, there is no separate TP. The

³ The maximum hammer energy required for the installation of the monopile foundations will be refined following analysis of the data collected during the geotechnical surveys.

TP and ancillary structure are fabricated as an integrated part of the jacket structure and is not installed separately offshore. Pin piles will typically be narrower than monopoles.

65. The maximum adverse design scenario for jacket foundations with pin piles is shown in Table 3.3.

Table 3.3: Design Envelope for Jacket Foundation with Pin Piles

Parameter	Maximum Design Envelope
Number of jacket foundations	242
Maximum number of legs per jacket foundation	4
Approximate height of platform above LAT (m)	30
Leg diameter (m)	4
Pin pile diameter (m)	4
Diameter foundation footprint (per jacket) (m ²) including scour protection	64
Hammer energy (kJ)	3,000

Suction Bucket Jacket Foundations

66. Suction bucket jacket foundations are formed with a steel lattice construction (comprising tubular steel members and welded joints) fixed to the seabed by suction buckets installed below each leg of the jacket. The suction buckets 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. Unlike monopiles, but similarly to piled jacket foundations, there is no separate TP. The TP and ancillary structure is fabricated as an integrated part of the jacket structure and is not installed separately offshore.
67. 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.
68. The maximum adverse design scenario for jacket foundations with suction buckets is provided in Table 3.4.

Table 3.4: Design Envelope for Suction Bucket Jacket Foundations

Parameter	Maximum Design Envelope
Number of jackets with suction buckets	242
Maximum number of legs per suction bucket foundation	4
Approximate height of platform above LAT (m)	30
Diameter of foundation footprint (m) including scour protection	320
Suction bucket diameter (m)	20
Expected penetration depth (m)	17

Gravity Base Foundations

69. Gravity base foundations are heavy steel, concrete, or steel and concrete structures sometimes including additional ballast, that sit on the seabed to support the wind turbine

tower. Gravity base foundations vary in shape and are placed in pre-prepared areas of seabed. Seabed preparation may involve levelling and dredging of the soft mobile sediments.

70. A gravity base does not require piling or drilling to remain in place. Scour protection is usually required to avoid the structure being undermined. The amount of ballast and scour protection will depend on structure design and location. The maximum adverse design scenario for gravity base foundations is shown in Table 3.5.

Table 3.5: Design Envelope for Gravity Base Foundations

Parameter	Maximum Design Envelope
Number of gravity base foundations	242
External diameter (excluding scour protection) (m)	55
Diameter foundation footprint (m)	220
Seabed preparation diameter (m)	220
Scour protection width (m)	220

Floating Foundations

71. Floating foundations can consist of a range of structure types, typically classed as spar buoys, semi-submersibles or tensioned-leg platforms (TLPs). The classification of floating foundations depends on how stability is achieved; by ballast at the base of the spar, by a wide structure at the water surface for a semi-submersible or by tension in the mooring lines for a TLP. The structure typically consists of either a single slender vertical cylindrical structure, called a spar buoy, a semi-submersible platform or a shallower and more complex structure consisting of various tubular and plate elements, called a TLP.
72. The foundations are typically fabricated from steel and/or concrete and are held in place by mooring lines connected to anchors in the seabed. The anchors could be piles, suction buckets, gravity structures or drag anchors. The structures will either be floated into place from harbour or brought to site on suitable installation vessels and lifted into the water. The anchors will be installed using a range of methods dependent on the anchor type, including piling, drilling, suction, and placement. The installation of the anchors is likely to be carried out by a separate vessel.
73. Floating foundations are only being considered as a demonstrator for the Proposed Development. As such, only a small number of floating foundations have the potential to be installed. Given the less mature nature of floating foundations, it is difficult to make an accurate estimation of substructure size at this stage in the project. The industry has not selected a preferred foundation type at this time. The parameters set out in Table 3.6 are therefore a high-level estimate of the maximum adverse design scenario for a floating foundation.
74. The maximum adverse design scenario for floating foundations is shown in Table 3.6.

Table 3.6: Design Envelope for Floating Foundations

Parameter	Maximum Design Envelope
Foundation surface dimension (m)	100 x 100
Depth of structure (m) in the water column	60
Number of mooring lines and anchors (per wind turbine)	3
Mooring cable radius (m)	200
Length of mooring cables (m)	150
Number of floating foundations	TBC

3.3.3. SCOUR PROTECTION FOR FOUNDATIONS

75. Foundation structures for wind turbines and OSPs 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: 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.
76. 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.
77. 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.
78. Table 3.7 provides an overview of the Proposed Development maximum design scenario for scour protection.

Table 3.7: Design Envelope for Scour Protection

Parameter	Maximum Design Envelope
Total wind farm scour protection material volume (m ³)	2,280,000
Total wind farm scour protection seabed area (km ²)	4.56

3.3.4. INTER-ARRAY CABLES

79. 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.
80. 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.
81. Cable installation methodology and potential cable protection measures will be finalised at the final design stage. The maximum adverse design scenario for inter array cables is presented in Table 3.8.

Table 3.8: Design Envelope for Inter-array Cables

Parameter	Maximum Design Envelope
Number of array cables	259
Total length of inter-array cabling (km)	1,036
Cable diameter (mm)	200
Minimum cable burial depth (m)	3
Cable installation seabed preparation	Plough / jet / scar plough / grapnel
Width of cable trench (m)	2
Width of seabed affected by installation per cable (m)	10
Total seabed disturbed (km ²)	10.036

3.3.5. OFFSHORE PLATFORMS

82. The Proposed Development may require up to ten offshore platforms. These offshore platforms may 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 platform topsides will be approximately 62 m (length) by 44 m (width), and approximately 50 m in height (LAT), excluding the helideck or lightning protection.
83. The platforms locations have not yet been selected and will be identified through detailed design consideration. Likewise, the foundation type for the offshore platforms will also be decided at the final design stage. A summary of the potential foundation structures for the offshore platforms is discussed below.
84. The maximum design scenario for the offshore platforms is described in Table 3.9.

Table 3.9: Design Envelope for Offshore Platforms

Parameter	Maximum Design Envelope
Maximum number of offshore platforms	10
Scour protection footprint (m ²)	2,880
Length of topside (m)	62
Width of topside (m)	44
Height (excluding helideck or lightning protection) (LAT) (m)	70

Piled Jacket Foundations

85. A description of piled jacket foundations, such as those which could be used for offshore platforms, is provided earlier in this section for wind turbines (see section 3.3.2). The maximum adverse design scenario for jacket foundations with pin piles for offshore platforms is shown in Table 3.10.

Table 3.10: Design Envelope for Jacket Foundations with Pin Piles for Offshore Platforms

Parameter	Maximum Design Envelope
Number of piled jack foundations	10
Maximum number of legs	6
Maximum leg diameter (m)	2.5
Maximum number of piles per structure	12
Pin pile diameter (m)	3
Maximum hammer energy (kJ)	3,000

Suction Bucket Jacket Foundations

86. A description of suction bucket jacket foundations, such as those which could be used for offshore platforms, is provided earlier in this section for wind turbines (see section 3.3.2). The maximum design scenario for suction bucket jacket foundations with pin piles for offshore platforms is shown in Table 3.11.

Table 3.11: Design Envelope for Suction Bucket Jacket Foundations for Offshore Platforms

Parameter	Maximum Design Envelope
Number of suction bucket foundations	10
Maximum number of legs using bucket foundation	6
Maximum bucket diameter (m)	20
Foundation footprint (m ²)	2,880

3.3.6. OFFSHORE TRANSMISSION INFRASTRUCTURE

Offshore Export Cables

87. Offshore export cables are used for the transfer of power from the offshore substations to the landfall point. The offshore export cables will have a maximum total length of 800 km, comprised of up to ten 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 m and 3 m per cable. There is the potential for seabed preparation to be required prior to cable installation, with methods such as plough, jet, scar plough and grapnel currently being considered.
88. 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.
89. The installation of the offshore export cables through the intertidal zone at the landfall will depend on the ground conditions and intertidal constraints, such as extensive debris, steep gradients, highly mobile sediments, hard bedrock, and protected sites. There are currently two methods of installation at the landfall being considered:
- 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.
90. The maximum adverse design scenario for the offshore transmission infrastructure is described in Table 3.12.

Table 3.12: Design Envelope for Offshore Export Cables

Parameter	Maximum Design Envelope
Number of cables	10
Maximum total cable length (km)	800
Cable diameter (mm)	300
Cable installation seabed preparation	Plough / jet / scar plough / grapnel
Cable burial depth (m)	3
Width of cable trench (m)	1
Width of seabed affected by installation per cable (m)	10
Total seabed disturbed (km ²)	8

3.4. OFFSHORE CONSTRUCTION PROGRAMME

91. The Proposed Development is likely to be constructed over a period of three years in line with the general construction series outlined below:
 - pre-construction surveys (including geotechnical surveys);
 - foundation installation;
 - OSP installation and commissioning;
 - offshore export cable - landfall installation;
 - offshore export cable - offshore installation;
 - additional commissioning post- offshore export cable installation if required;
 - inter-array cable installation; and
 - wind turbine installation and commissioning.
92. 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.
93. 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

94. Operations and maintenance works will be conducted from either a Service Operations Vessel (SOV), helicopter, drones or Crew Transfer Vessel (CTV). The details of estimated annual and total operations and maintenance (O&M) activities will be detailed within the PDE of the EIA Report.

3.6. DECOMMISSIONING PHASE

95. 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 Ministers. 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

96. 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.
97. 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

98. 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 2.3 and Table 2.1.
99. 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 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.

4.1.2. INITIAL IDENTIFICATION OF SITES

Criterion 1

100. 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

101. 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

102. 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.

103. 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, with a reasonable level of precaution applied. 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.

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

104. 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 for all sites are provided in Annex A.
105. 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 offshore export cable corridor.

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 Berwick Bank Proposed Development Array Area (km)	Distance to Berwick Bank Proposed Offshore Export Cable Corridor
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	36	3

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

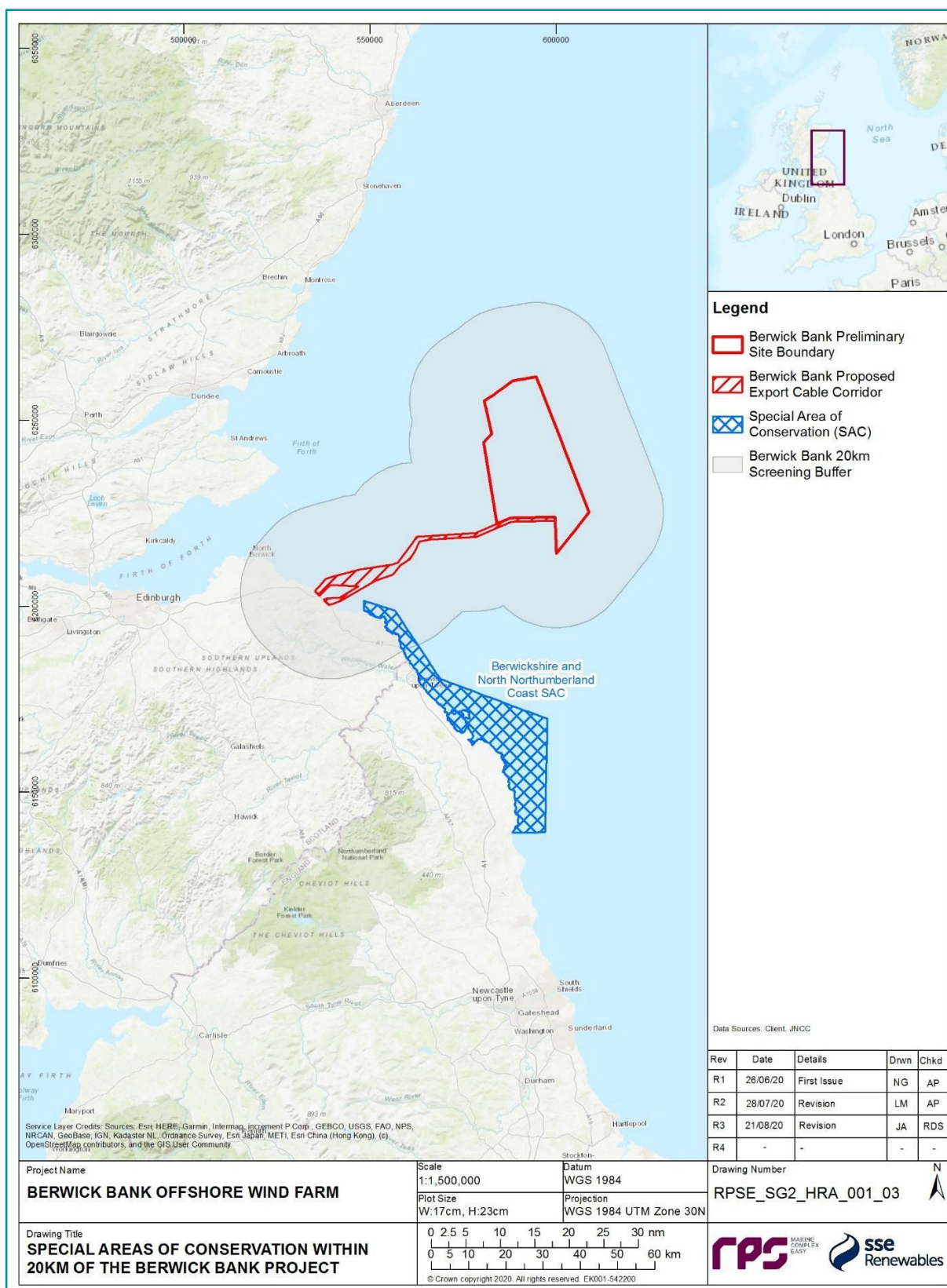


Figure 4.1: Location of European Sites Designated for Annex I Habitats to be Taken Forward for Determination of LSE

4.2. SITES DESIGNATED FOR ANNEX II DIADROMOUS FISH

106. 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 2.3 and Table 2.1.
107. 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 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.

4.2.1. INITIAL IDENTIFICATION OF SITES

Criterion 1

108. 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.

Criterion 2

109. 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.
110. 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. On this basis, it has been considered that sites with Annex II diadromous fish as qualifying features which are located within a 100 km buffer of the Proposed Development could potentially be affected and must, therefore, be taken forward for determination of LSE in section 5.3 of this report. A total of six European sites have been screened in using this criterion (Figure 4.2). These are:
 - Tweed Estuary SAC;
 - River Tweed SAC;
 - River South Esk SAC;
 - River Tay SAC;
 - River Dee SAC; and
 - River Teith SAC.

Criterion 3

111. 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.

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

112. 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 Annex A.

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 Proposed Development Array Area (km)	Distance to Proposed Development Offshore Cable Corridor
Tweed Estuary SAC ¹	- Sea lamprey (<i>Petromyzon marinus</i>) - River lamprey (<i>Lampetra fluviatilis</i>)	49.7	27.5
River Tweed SAC ^{1, 2}	- Atlantic salmon (<i>Salmo salar</i>) - Sea lamprey (<i>Petromyzon marinus</i>) - River lamprey (<i>Lampetra fluviatilis</i>)	52.4	9.2
River South Esk SAC	- Atlantic salmon (<i>Salmo salar</i>) - Freshwater pearl mussel (<i>Margaritifera margaritifera</i>) ³	61.3	74.6
River Tay SAC ^{1, 2, 4}	- Atlantic salmon (<i>Salmo salar</i>) - Sea lamprey (<i>Petromyzon marinus</i>) - River lamprey (<i>Lampetra fluviatilis</i>)	75.0	68.1
River Dee SAC ⁴	- Atlantic salmon (<i>Salmo salar</i>) - Freshwater pearl mussel (<i>Margaritifera margaritifera</i>) ³	77.7	100.0
River Teith SAC ²	- Atlantic salmon (<i>Salmo salar</i>) - Sea lamprey (<i>Petromyzon marinus</i>) - River lamprey (<i>Lampetra fluviatilis</i>)	140.8	94.9

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 benthic receptors 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

113. Based on data collected to date during aerial surveys for the Proposed Development and the Marr Bank Wind Farm, 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*).
114. This section does not consider European otter *Lutra lutra*; this species will be covered by the separate HRA process for the onshore elements (landward of MHWS) of the Proposed Development, should it be required.

4.3.1. INITIAL IDENTIFICATION OF SITES

115. 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 2.3 and Table 2.1.
116. 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

117. 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

118. 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 below.

Cetaceans

119. 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 EIA Scoping Report for the Proposed Development (SSE, 2020), could potentially be affected and must therefore, be taken forward

for determination of LSE in section 5.4 of this report. 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.

120. All Natura 2000 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

121. 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 2017 (Sparling *et al.*, 2012; see Annex B). Harbour seal tend to make relatively short foraging trips from haul out sites and the latest Special Committee on Seal (SCOS) report (SCOS, 2018) states that harbour seal 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 Annex B). 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 Natura 2000 sites and the Proposed Development.
122. 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 seal using the Proposed Development and Natura 2000 sites along the Dutch, German, Danish and Swedish coastlines.
123. The screening process for harbour seal includes any Natura 2000 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

124. A screening range of 100 km has been adopted to identify sites with grey seal as qualifying features 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). A total of two European sites for grey seal have been screened in using this criterion (see Table 4.3).

Criterion 3

125. 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 buffers proposed above for both cetaceans and pinnipeds in criterion 2, the ZOI for key impacts to marine mammals

(i.e. underwater noise, collision risk and changes to prey species) are anticipated to be will be well within this area. No additional European sites with Annex II marine mammal species as qualifying features, beyond those already identified for criterion 2 are therefore 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

126. 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 Annex A.

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 Berwick Bank Proposed Development Array Area (km)	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)
United Kingdom					
1	Berwickshire and North Northumberland Coast SAC ¹	UK0017072	Grey seal (<i>Halichoerus grypus</i>)	36	3
2	Isle of May SAC ²	UK0030172	Grey seal (<i>Halichoerus grypus</i>)	54	21
3	Firth of Tay and Eden Estuary SAC ²	UK0030311	Harbour seal (<i>Phoca vitulina</i>)	62	45
4	Southern North Sea SAC	UK0030395	Harbour porpoise (<i>Phocoena phocoena</i>)	146	150
5	Moray Firth SAC ²	UK0019808	Bottlenose dolphin (<i>Tursiops truncatus</i>)	218	254
Germany					
6	Doggerbank SCI ^{2,3}	DE1003301	Harbour porpoise (<i>Phocoena phocoena</i>)	311	320
7	Sylter Außenriff SCI ^{2,3,4}	DE1209301	Harbour porpoise (<i>Phocoena phocoena</i>)	496	505
8	Borkum-Riffgrund SCI ^{2,3,4}	DE2104301	Harbour porpoise (<i>Phocoena phocoena</i>)	525	534
9	SPA Östliche Deutsche Bucht SCI ⁴	DE1011401	Harbour porpoise (<i>Phocoena phocoena</i>)	541	550
10	Nationalpark Niedersächsisches Wattenmeer SAC ^{2,3,4}	DE2306301	Harbour porpoise (<i>Phocoena phocoena</i>)	569	575
11	NTP S-H Wattenmeer und angrenzende Küstengebiete SAC ^{2,3,4}	DE0916391	Harbour porpoise (<i>Phocoena phocoena</i>)	596	605
12	Helgoland mit Helgoländer Felssockel SAC ^{2,3}	DE1813391	Harbour porpoise (<i>Phocoena phocoena</i>)	615	624
13	Steingrund SAC ^{2,3}	DE1714391	Harbour porpoise (<i>Phocoena phocoena</i>)	623	631
14	Hamburgisches Wattenmeer SAC ^{2,3,4}	DE2016301	Harbour porpoise (<i>Phocoena phocoena</i>)	651	659
15	Unterweser SCI ^{2,3,4}	DE2316331	Harbour porpoise (<i>Phocoena phocoena</i>)	673	681

ID	European Site	Site Code	Relevant Annex II Features	Distance to Berwick Bank Proposed Development Array Area (km)	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)
16	Unterebbe SCI ^{2,3,4}	DE2018331	Harbour porpoise (<i>Phocoena phocoena</i>)	685	693
Denmark					
17	Sydlig Nordsø SAC ^{2,3}	DK00VA347	Harbour porpoise (<i>Phocoena phocoena</i>)	509	518
18	Gule Rev SAC ²	DK00VA259	Harbour porpoise (<i>Phocoena phocoena</i>)	573	581
19	Vadehavet med Ribe Å, Tved Å og Varde Å vest for Varde SAC ^{2,3,4}	DK00AY176	Harbour porpoise (<i>Phocoena phocoena</i>)	582	591
20	Store Rev SAC ²	DK00VA258	Harbour porpoise (<i>Phocoena phocoena</i>)	655	664
21	Skagens Gren og Skagerak SAC ²	DK00FX112	Harbour porpoise (<i>Phocoena phocoena</i>)	696	705
Netherlands					
22	Doggersbank SAC ^{2,3}	NL2008001	Harbour porpoise (<i>Phocoena phocoena</i>)	292	300
23	Klaverbank ^{2,3}	NL2008002	Harbour porpoise (<i>Phocoena phocoena</i>)	330	337
Sweden					
24	Kosterfjorden-Väderöfjorden SAC ^{2,3}	SE0520170	Harbour porpoise (<i>Phocoena phocoena</i>)	782	792

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.

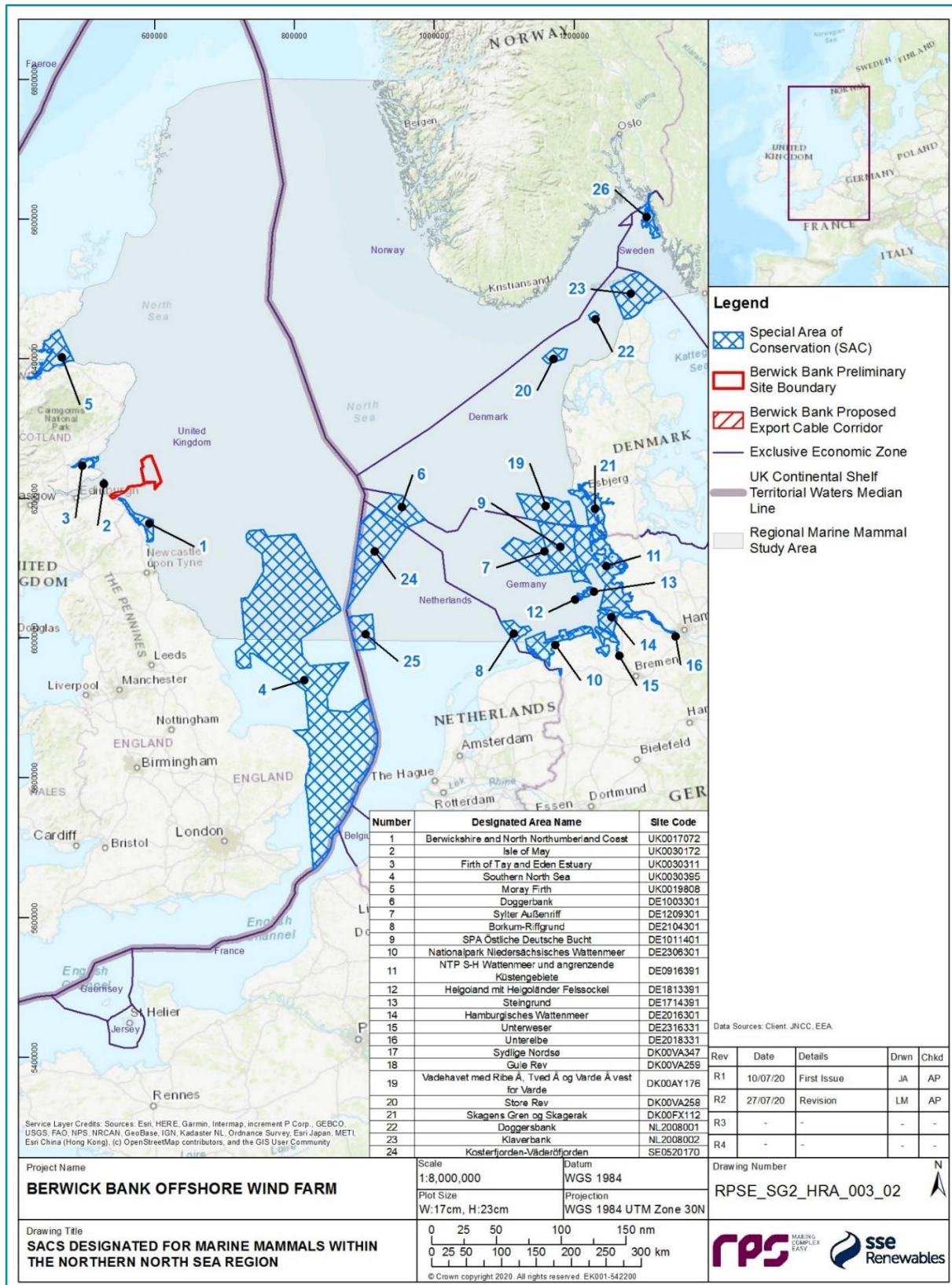


Figure 4.3: Location of European Sites Designated for Annex II Marine Mammal Species Taken Forward for Determination of LSE

4.4. SITES DESIGNATED FOR MARINE ORNITHOLOGICAL FEATURES

127. Based on data collected to date during aerial surveys for the Proposed Development and the Marr Bank Wind Farm, the ornithological interests likely to occur in the vicinity of the Proposed Development and therefore considered in the LSE screening include seabirds and migratory waterbirds.
128. At this stage in the development programme for the Proposed Development, detailed baseline analysis has not yet been undertaken. However, based on initial analysis of the data collected during aerial surveys in the 2019 breeding season for the Proposed Development and the Marr Bank Wind Farm, the following species, which are qualifying interest features of European sites within foraging range of the Proposed Development, are not considered further because the densities of these species within the marine ornithology study area are negligible (i.e. less than 10 individuals were recorded):
- breeding Sandwich tern *Sterna sandvicensis* - provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at very low densities (monthly range <0.02 birds/km²) with just eight birds recorded within the offshore ornithology study area in August 2019;
 - breeding great skua *Stercorarius skua* - provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at negligible densities (monthly range <0.01 birds/km²) within the offshore ornithology study area;
 - breeding Leach's storm-petrel *Oceanodroma leucorhoa* - this species was not recorded by the aerial surveys between March and September 2019 within the offshore ornithology study area;
 - breeding Manx shearwater *Puffinus puffinus* - provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at very low densities (monthly range <0.02 birds/km²) within the offshore ornithology study area;
 - breeding cormorant *Phalacrocorax carbo* - this species was not recorded by the aerial surveys between March and September 2019 within the offshore ornithology study area; and
 - breeding shag *Phalacrocorax aristotelis* - provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at negligible densities (monthly range <0.01 birds/km²) within the offshore ornithology study area.
129. The following sections detail the results of the stepwise process to identify the European sites with relevant seabirds and migratory waterbirds as qualifying interest features to be taken forward for detailed determination of LSE based on the methodology and criteria outlined in section 2.3 and Table 2.1.
130. As noted above in section 2.1, Ramsar sites are included for consideration under the HRA process. However, all relevant Ramsar sites identified in this section of the Berwick Bank LSE Screening Report are also designated as SPAs and are therefore not discussed separately.

4.4.1. INITIAL IDENTIFICATION OF SITES

Criterion 1

131. Criterion 1 considers European or Ramsar sites which overlap with the boundaries of the Proposed Development. The only European site (for ornithology) that overlaps with the Proposed Development is the Outer Firth of Forth and St Andrew's Bay Complex pSPA, which overlaps with part of the proposed offshore export cable corridor (Figure 4.4). All

qualifying interests of this pSPA, which includes marine and coastal/intertidal species, are therefore considered for determination of LSE in section 5.5.

Criterion 2

132. 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 seabird and migratory waterbird 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 seabird and migratory waterbird receptors are discussed below.

Seabirds

133. A precautionary approach to the identification of relevant sites for seabirds 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 seabird species as qualifying interest features which are located within a buffer that equates to the offshore ornithology regional study area (Figure 4.4), as defined in the EIA Scoping Report for the Proposed Development (SSE, 2020), could potentially be affected. This was defined by the largest species-specific foraging range of the species considered likely to feature in the assessment: Northern gannet *Morus bassanus* (range $315.2 \text{ km} \pm 194.2 \text{ km}$; Woodward *et al.* 2019). The search was therefore limited to breeding seabird SPAs within 509.4 km (along a marine pathway) of the Proposed Development array area. Table 4.4 shows the mean-maximum (plus 1 standard deviation (S.D.)) foraging ranges of breeding seabirds (from Woodward *et al.*, 2019) used to select the qualifying interest features of SPAs designated for their important populations of breeding seabirds and listed in Table 4.5. Only the qualifying interest species within foraging range of the Proposed Development are listed in Table 4.5; the qualifying interest features (species) of the site that are beyond foraging range from the Proposed Development have been excluded from further consideration.

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

Species	Mean-maximum + 1 S.D. Foraging Range (km)
Red-throated diver <i>Gavia stellata</i>	9.0 (no S.D. available)
Razorbill <i>Alca torda</i>	88.7 ± 75.9
Common guillemot <i>Uria aalge</i>	73.2 ± 80.5
Great Black-backed gull <i>Larus marinus</i>	73.0 (no S.D. available)
Leach's storm-petrel <i>Oceanodroma leucorhoa</i>	657.0 (mean, no S.D. available)
Herring gull <i>Larus argentatus</i>	58.8 ± 26.8
Northern fulmar <i>Fulmarus glacialis</i>	542.3 ± 657.9
Common gull <i>Larus canus</i>	50.0 (no S.D. available)
Little tern <i>Sternula albifrons</i>	5.0 (no S.D. available)
Great skua <i>Stercorarius skua</i>	443.3 ± 487.9
Black guillemot <i>Cephus grylle</i>	4.8 ± 4.3
Sandwich tern <i>Thalasseus sandvicensis</i>	34.3 ± 23.2

Species	Mean-maximum + 1 S.D. Foraging Range (km)
European storm-petrel <i>Hydrobates pelagicus</i>	336.0 (no S.D. available)
Northern gannet <i>Morus bassanus</i>	315.2 ± 194.2
Arctic tern <i>Sterna paradisaea</i>	25.7 ± 14.8
Cormorant <i>Phalacrocorax carbo</i>	25.6 ± 8.3
Common eider <i>Somateria mollissima</i>	21.5 (no S.D. available)
Mediterranean gull <i>Ichthyaeetus melanocephalus</i>	20.0 (no S.D. available)
Black-headed gull <i>Chroicocephalus ridibundus</i>	18.5 (no S.D. available)
Common tern <i>Sterna hirundo</i>	18.0 ± 8.9
Black-legged kittiwake <i>Rissa tridactyla</i>	156.1 ± 144.5
Atlantic puffin <i>Fratercula arctica</i>	137.1 ± 128.3
Manx shearwater <i>Puffinus puffinus</i>	1346.0 ± 1018.7
European shag <i>Phalacrocorax aristotelis</i>	13.2 ± 10.5
Lesser black-backed gull <i>Larus fuscus</i>	127.0 ± 109
Roseate tern <i>Sterna dougallii</i>	12.6 ± 10.6

134. A total of 27 SPAs for breeding seabirds selected under criterion 2 are taken forward for determination of LSE (see Table 4.5).

Migratory Waterbirds

135. For selection of European sites designated for migratory waterbirds, consideration has been given to the likely migratory pathways and distribution at coastal estuarine sites and inland waterbody roost sites. The search area for initial screening has therefore been defined as the estuarine sites and inland waterbodies within the Eastern Lowlands Natural Heritage Zone and Border Hills Natural Heritage Zone (NHZ) (see Figure 4.4). The Slamannan Plateau SPA which is in the West Central Belt NHZ, has also been included as it is designated for its Taiga bean goose qualifying interest feature which potentially has a migratory pathway across the Forth of Forth. All European sites which have migratory waterbirds as qualifying interests features within the offshore ornithology regional study area have therefore been taken forward for determination of LSE.
136. A total of 14 SPAs for migratory waterbirds selected under criterion 2 are taken forward for determination of LSE (see Table 4.5).

Criteria 3

137. 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). The ZOI of the Proposed Development for most bird species is limited to the area within 2 km of the Proposed Development array area and proposed offshore export cable corridor, which is the area over which displacement effects are potentially considered to occur. This may extend to 4 km for sites which have red-throated diver *Gavia stellate* as a qualifying interest feature only. No additional sites are screened in for further consideration on the basis of this criterion.

4.4.2. SUMMARY OF INITIAL SCREENING OF SITES FOR SEABIRDS AND MIGRATORY WATERBIRDS

138. The initial screening process has identified 41 European sites with seabirds or migratory waterbirds as qualifying interest features to be taken forward for detailed determination of LSE in section 5.5 of this report. The sites are listed together with distance to the Proposed Development along a marine pathway in Table 4.5 and shown in Figure 4.4. The Natura 2000 standard data forms for all sites are provided in Annex A.

Table 4.5: European Sites Designated for Ornithological Features (Seabirds and Migratory Waterbirds) Taken Forward for Determination of LSE

ID	European Site	Site Code	Relevant Features	Distance to Berwick Bank Proposed Development Array Area (km)	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)
Seabird Sites					
1	Outer Firth of Forth and St Andrew's Bay Complex pSPA	UK9020316	- Arctic tern <i>Sterna paradisaea</i> (breeding) - black-headed gull <i>Chroicocephalus ridibundus</i> (non-breeding) - common gull <i>Larus canus</i> (non-breeding) - common scoter <i>Melanitta nigra</i> (non-breeding) - common tern <i>Sterna hirundo</i> (breeding) - eider <i>Somateria mollissima</i> (non-breeding) - gannet <i>Morus bassanus</i> (breeding) - goldeneye <i>Bucephala clangula</i> (non-breeding) - guillemot <i>Uria aalge</i> (breeding and non-breeding) - herring gull <i>Larus argentatus</i> (breeding and non-breeding) - kittiwake <i>Rissa tridactyla</i> (breeding and non-breeding) - little gull <i>Hydrocoloeus minutus</i> (non-breeding) - long-tailed duck <i>Clangula hyemalis</i> (non-breeding) - puffin <i>Fratercula arctica</i> (breeding) - razorbill <i>Alca torda</i> (non-breeding) - red-breasted merganser <i>Mergus serrator</i> (non-breeding) - red-throated diver <i>Gavia stellata</i> (non-breeding) - seabird assemblage (breeding and non-breeding) - shag <i>Phalacrocorax aristotelis</i> (non-breeding) - slavonian grebe <i>Podiceps auritus</i> (non-breeding) - velvet scoter <i>Melanitta fusca</i> (non-breeding) - waterfowl assemblage (non-breeding)	4.2	0.0
2	St Abb's Head to Fast Castle SPA	UK9004271	guillemot <i>Uria aalge</i> (breeding)	38.3	3.9

ID	European Site	Site Code	Relevant Features	Distance to Berwick Bank Proposed Development Array Area (km)	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)
3	Northumberland Marine SPA	UK9020325	• herring gull <i>Larus argentatus</i> (breeding) • kittiwake <i>Rissa tridactyla</i> (breeding) • razorbill <i>Alca torda</i> (breeding) • seabird assemblage (breeding) • Arctic tern <i>Sterna paradisaea</i> (breeding) • guillemot <i>Uria aalge</i> (breeding) • puffin <i>Fratercula arctica</i> (breeding) • seabird assemblage (breeding)	46.6	30.7
4	Farne Islands SPA	UK9006021	• guillemot <i>Uria aalge</i> (breeding) • seabird assemblage (breeding)	47.8	50.7
5	Forth Islands SPA	UK9004171	• Arctic tern <i>Sterna paradisaea</i> (breeding) • common tern <i>Sterna hirundo</i> (breeding) • gannet <i>Morus bassanus</i> (breeding) • guillemot <i>Uria aalge</i> (breeding) • herring gull <i>Larus argentatus</i> (breeding) • kittiwake <i>Rissa tridactyla</i> (breeding) • lesser black-backed gull <i>Larus fuscus</i> (breeding) • puffin <i>Fratercula arctica</i> (breeding) • razorbill (breeding) • roseate tern <i>Sterna douallii</i> (breeding) • seabird assemblage (breeding)	52.1	13.8
6	Fowlsheugh SPA	UK9002271	• fulmar <i>Fulmarus glacialis</i> (breeding) • guillemot <i>Uria aalge</i> (breeding) • herring gull <i>Larus argentatus</i> (breeding) • kittiwake <i>Rissa tridactyla</i> (breeding) • razorbill <i>Alca torda</i> (breeding) • seabird assemblage (breeding)	58.6	87.9

ID	European Site	Site Code	Relevant Features	Distance to Berwick Bank Proposed Development Array Area (km)	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)
7	Buchan Ness to Collieston Coast SPA	UK9002491	- fulmar <i>Fulmarus glacialis</i> (breeding) - guillemot <i>Uria aalge</i> (breeding) - kittiwake <i>Rissa tridactyla</i> (breeding) - seabird assemblage (breeding)	96.2	132.2
8	Troup, Pennan and Lion's Heads SPA	UK9002471	- fulmar <i>Fulmarus glacialis</i> (breeding) - guillemot <i>Uria aalge</i> (breeding) - kittiwake <i>Rissa tridactyla</i> (breeding) - razorbill <i>Alca torda</i> (breeding) - seabird assemblage (breeding)	151.8	188.5
9	East Caithness Cliffs SPA	UK9001182	- fulmar <i>Fulmarus glacialis</i> (breeding) - kittiwake <i>Rissa tridactyla</i> (breeding) - seabird assemblage (breeding)	238.1	274.7
10	Flamborough and Filey Coast SPA	UK9006101	- gannet <i>Morus bassanus</i> (breeding) - kittiwake <i>Rissa tridactyla</i> (breeding) - seabird assemblage (breeding)	211.6	220.0
11	North Caithness Cliffs SPA	UK9001181	- fulmar <i>Fulmarus glacialis</i> (breeding) - kittiwake <i>Rissa tridactyla</i> (breeding) - puffin <i>Fratercula arctica</i> (breeding) - seabird assemblage (breeding)	261.2	297.9
12	Copinsay SPA	UK9002151	- fulmar <i>Fulmarus glacialis</i> (breeding) - kittiwake <i>Rissa tridactyla</i> (breeding) - seabird assemblage (breeding)	275.2	311.9
13	Hoy SPA	UK9002141	- fulmar <i>Fulmarus glacialis</i> (breeding) - kittiwake <i>Rissa tridactyla</i> (breeding) - seabird assemblage (breeding)	280.5	317.2
14	Calf of Eday SPA	UK9002431	fulmar <i>Fulmarus glacialis</i> (breeding)	312.8	349.5

ID	European Site	Site Code	Relevant Features	Distance to Berwick Bank Proposed Development Array Area (km)	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)
15	Rousay SPA	UK9002371	- seabird assemblage (breeding) - fulmar <i>Fulmarus glacialis</i> (breeding) - seabird assemblage (breeding)	313.0	349.7
16	West Westray SPA	UK9002101	- fulmar <i>Fulmarus glacialis</i> (breeding) - seabird assemblage (breeding)	323.0	359.6
17	Fair Isle SPA	UK9002091	- fulmar <i>Fulmarus glacialis</i> (breeding) - gannet <i>Morus bassanus</i> (breeding) - seabird assemblage (breeding)	334.1	371.7
18	Sule Skerry and Sule Stack SPA	UK9002181	- gannet <i>Morus bassanus</i> (breeding) - seabird assemblage (breeding)	352.6	389.3
19	Cape Wrath SPA	UK9001231	- fulmar <i>Fulmarus glacialis</i> (breeding) - seabird assemblage (breeding)	370.4	407.1
20	Sumburgh Head SPA	UK9002511	- fulmar <i>Fulmarus glacialis</i> (breeding) - seabird assemblage (breeding)	372.5	410.2
21	Foula SPA	UK9002061	- fulmar <i>Fulmarus glacialis</i> (breeding) - seabird assemblage (breeding)	402.3	439.5
22	Handa SPA	UK9001241	- fulmar <i>Fulmarus glacialis</i> (breeding) - seabird assemblage (breeding)	403.5	440.2
23	Noss SPA	UK9002081	- fulmar <i>Fulmarus glacialis</i> (breeding) - gannet <i>Morus bassanus</i> (breeding) - seabird assemblage (breeding)	404.3	441.9
24	North Rona and Sula Sgeir SPA	UK9001011	- fulmar <i>Fulmarus glacialis</i> (breeding) - gannet <i>Morus bassanus</i> (breeding) - seabird assemblage (breeding)	428.4	465.1
25	Fetlar SPA	UK9002031	fulmar <i>Fulmarus glacialis</i> (breeding)	465.4	502.9

ID	European Site	Site Code	Relevant Features	Distance to Berwick Bank Proposed Development Array Area (km)	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)
26	Shiant Isles SPA	UK9001041	- seabird assemblage (breeding) - fulmar <i>Fulmarus glacialis</i> (breeding) - seabird assemblage (breeding)	485.8	522.5
27	Hermaness, Saxa Vord and Valla Field SPA	UK9002011	- fulmar <i>Fulmarus glacialis</i> (breeding) - gannet <i>Morus bassanus</i> (breeding) - seabird assemblage (breeding)	478.7	516.3
Migratory Waterbird Sites (Estuarine)					
28	Firth of Forth SPA and Ramsar site	UK9004411 UK13017	- bar-tailed godwit <i>Limosa lapponica</i> (non-breeding) - common Scoter <i>Melanitta nigra</i> (non-breeding) - cormorant <i>Phalacrocorax carbo</i> (non-breeding) - curlew <i>Numenius arquata</i> (non-breeding) - dunlin <i>Calidris alpina alpina</i> (non-breeding) - eider <i>Somateria mollissima</i> (non-breeding) - golden plover <i>Pluvialis apricaria</i> (non-breeding) - goldeneye <i>Bucephala clangula</i> (non-breeding) - great crested grebe <i>Podiceps cristatus</i> (non-breeding) - grey plover <i>Pluvialis squatarola</i> (non-breeding) - knot <i>Calidris canutus</i> (non-breeding) - lapwing <i>Vanellus vanellus</i> (non-breeding) - long-tailed duck <i>Clangula hyemalis</i> (non-breeding) - mallard <i>Anas platyrhynchos</i> (non-breeding) - oystercatcher <i>Haematopus ostralegus</i> (non-breeding) - pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding) - red-breasted merganser <i>Mergus serrator</i> (non-breeding) - red-throated diver <i>Gavia stellata</i> (non-breeding) - redshank <i>Tringa totanus</i> (non-breeding) - ringed plover <i>Charadrius hiaticula</i> (non-breeding)	55.3	6.2

ID	European Site	Site Code	Relevant Features	Distance to Berwick Bank Proposed Development Array Area (km)	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)
29	Montrose Basin SPA and Ramsar site	UK9004031 UK13046	- sandwich tern <i>Sterna sandvicensis</i> (passage) - scaup <i>Aythya marila</i> (non-breeding) - shelduck <i>Tadorna tadorna</i> (non-breeding) - slavonian grebe <i>Podiceps auritus</i> (non-breeding) - turnstone <i>Arenaria interpres</i> (non-breeding) - velvet scoter <i>Melanitta fusca</i> (non-breeding) - waterfowl assemblage (non-breeding) - wigeon <i>Anas penelope</i> (non-breeding)	57.4	74.1
			dunlin <i>Calidris alpina alpina</i> (non-breeding)		
			eider <i>Somateria mollissima</i> (non-breeding)		
			greylag goose <i>Anser anser</i> (non-breeding)		
			knot <i>Calidris canutus</i> (non-breeding)		
			oystercatcher <i>Haematopus ostralegus</i> (non-breeding)		
			pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding)		
			redshank <i>Tringa totanus</i> (non-breeding)		
			shelduck <i>Tadorna tadorna</i> (non-breeding)		
			waterfowl assemblage (non-breeding)		
			wigeon <i>Anas penelope</i> (non-breeding)		
			bar-tailed godwit <i>Limosa lapponica</i> (non-breeding)		
			common Scoter <i>Melanitta nigra</i> (non-breeding)		
			cormorant <i>Phalacrocorax carbo</i> (non-breeding)		
30	Firth of Tay and Eden Estuary SPA and Ramsar site	UK9004121 UK13018	dunlin <i>Calidris alpina alpina</i> (non-breeding)	62.6	48.1
			eider <i>Somateria mollissima</i> (non-breeding)		
			goldeneye <i>Bucephala clangula</i> (non-breeding)		
			goosander <i>Mergus merganser</i> (non-breeding)		
			grey plover <i>Pluvialis squatarola</i> (non-breeding)		
			greylag goose <i>Anser anser</i> (non-breeding)		

ID	European Site	Site Code	Relevant Features	Distance to Berwick Bank Proposed Development Array Area (km)	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)
31	Ythan Estuary, Sands of Forvie and Meikle Loch SPA, Ythan Estuary and Meikle Loch Ramsar site	UK9002221 UK13061	- Icelandic black-tailed godwit <i>Limosa limosa islandica</i> (non-breeding) - long-tailed duck <i>Clangula hyemalis</i> (non-breeding) - oystercatcher <i>Haematopus ostralegus</i> (non-breeding) - pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding) - red-breasted merganser <i>Mergus serrator</i> (non-breeding) - redshank <i>Tringa totanus</i> (non-breeding) - sanderling <i>Calidris alba</i> (non-breeding) - shelduck <i>Tadorna tadorna</i> (non-breeding) - velvet scoter <i>Melanitta fusca</i> (non-breeding) - waterfowl assemblage (non-breeding)	95.2	130.9
Migratory Waterbird Sites (Inland Waterbodies)					
32	Greenlaw Moor SPA and Ramsar site	UK9004281	pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding)	66.5	23.4
33	Cameron Reservoir SPA and Ramsar site	UK13022 UK9004131	pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding)	71.1	42.0
34	Din Moss - Hoselaw Loch SPA and Ramsar site	UK13005 UK9004291	- greylag goose <i>Anser anser</i> (non-breeding) - pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding)	74.3	40.8
35	Fala Flow SPA and Ramsar site	UK13010 UK9004241	pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding)	85.3	33.4
		UK13015			

ID	European Site	Site Code	Relevant Features	Distance to Berwick Bank Proposed Development Array Area (km)	Distance to Berwick Bank Proposed Offshore Export Cable Corridor (km)
36	Loch of Kinnordy SPA and Ramsar site	UK9004051	• greylag goose <i>Anser anser</i> (non-breeding) • pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding)		
37	Gladhouse Reservoir SPA and Ramsar site	UK13038 UK9004231	• pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding)	99.4	47.2
38	Loch Leven SPA and Ramsar site	UK13021 UK9004111 UK13033	• cormorant <i>Phalacrocorax carbo</i> (non-breeding) • gadwall <i>Anas strepera</i> (non-breeding) • goldeneye <i>Bucephala clangula</i> (non-breeding) • pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding) • pochard <i>Aythya ferina</i> (non-breeding) • shoveler <i>Anas clypeata</i> (non-breeding) • teal <i>Anas crecca</i> (non-breeding) • tufted duck <i>Aythya fuligula</i> (non-breeding) • waterfowl assemblage (non-breeding) • whooper swan <i>Cygnus cygnus</i> (non-breeding)	102.4	59.8
39	South Tayside Goose Roosts SPA and Ramsar site	UK9004401 UK13057	• greylag goose <i>Anser anser</i> (non-breeding) • pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding) • waterfowl assemblage (non-breeding) • wigeon <i>Anas penelope</i> (non-breeding)	115.4	81.9
40	Westwater SPA and Ramsar site	UK9004251 UK13060	• pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding) • waterfowl assemblage (non-breeding)	117.7	65.3
41	Slamannan Plateau SPA	UK9004441	• taiga bean goose <i>Anser fabalis fabalis</i> (non-breeding)	139.3	89.0

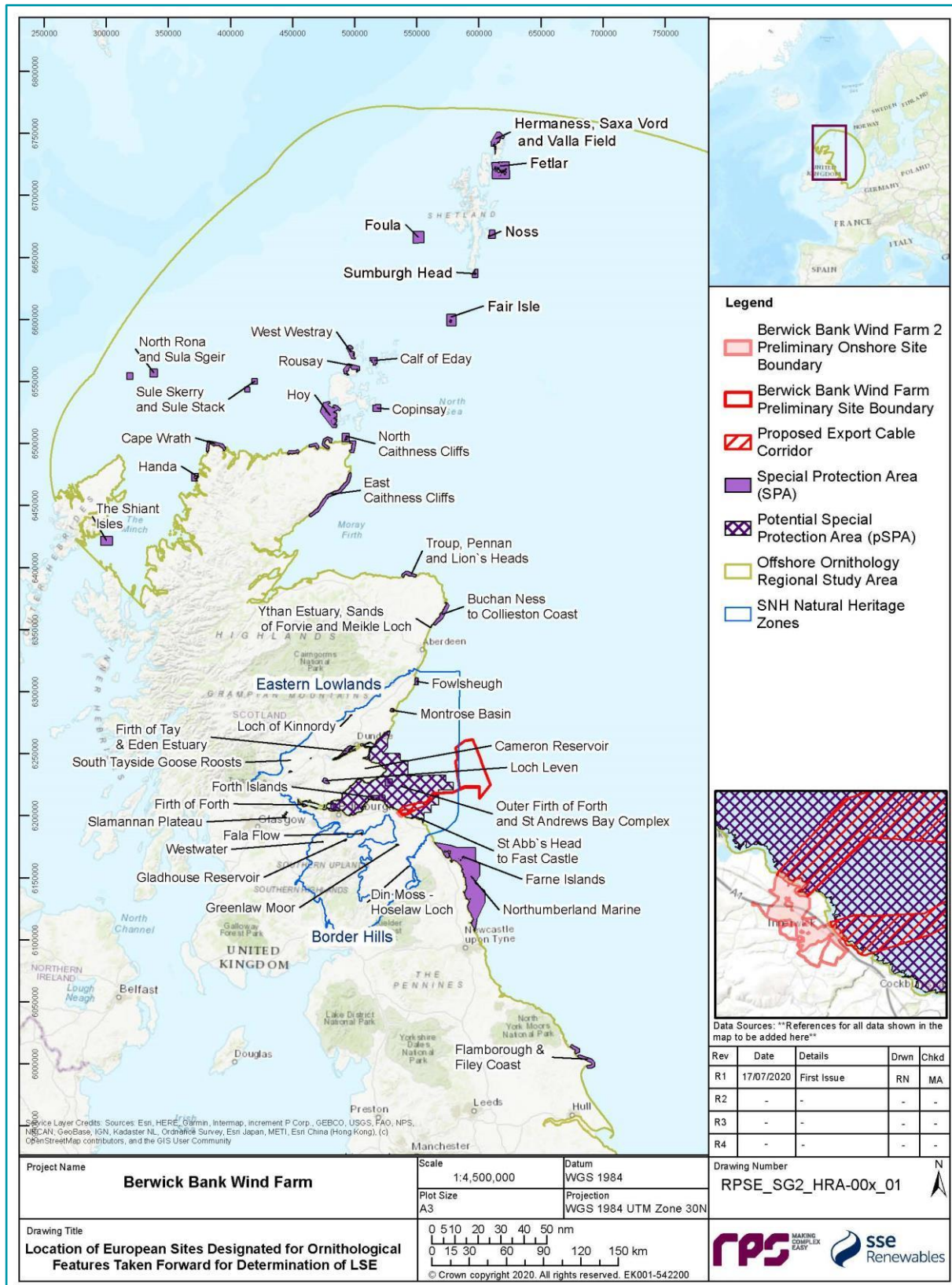


Figure 4.4: Location of European Sites Designated for Ornithological Features (Seabirds and Migratory Waterbirds) Taken Forward for Determination of LSE

5. DETERMINATION OF LIKELY SIGNIFICANT EFFECT

139. 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 screened in for further consideration through section 4.

5.1. METHODOLOGY

140. 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.
141. 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.
142. The approach adopted for this LSE screening report focusses on the 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.
143. 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
144. 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.*"
145. In accordance with this ruling, relevant measures which are likely to be implemented as part of the Proposed Development or other specific mitigation measures have been noted within this LSE screening assessment, but the final assessments of the potential for LSE have been made in the absence of any such measures. 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-Indigenous Species (INIS) (e.g. a Project Environmental Management and

Monitoring Plan (PEMMP)). Whilst it is likely that such plans will be produced and implemented for the Proposed Development, it is acknowledged that such a plan would be produced post-consent and, as such, the content is not currently known. These measures and other measures which may have been adopted as part of the Proposed Development have therefore not informed the assessment of LSE.

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

146. 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.

5.2.1. SITE OVERVIEW

Berwickshire and North Northumberland SAC

147. 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 SNH, 2020). The Natura 2000 standard data form for the site is provided in Annex A.
148. The qualifying interest features of this site are detailed in Table 5.2.

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

149. There is considerable knowledge from previous offshore wind farm projects, including from Seagreen Alpha and Seagreen 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 SNH, 2020). Using this information, 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 (SSE, 2020). 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.

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 SNH, 2020)
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 (INIS). - Physical change (to another seabed type).
Accidental pollution	- Hydrocarbon and PAH contamination. - Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). - Transition elements and organo-metal (e.g. TBT) contamination.
Decommissioning Phase	

Impact Description Used in HRA and EIA	Equivalent Pressure Defined for Site (Natural England and SNH, 2020)
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.

150. Consideration of the potential impacts identified for Annex I habitats is presented in the following sections to inform the determination of LSE in section 5.2.2.

Construction Phase

Temporary Habitat Loss / Disturbance

151. 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.
152. There is considered to be 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

153. 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 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).
154. 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 offshore export cable corridor 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

155. 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. Due however, 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 risk of sediment bound contaminants being present in concentrations likely to be harmful to benthic receptors is considered to be low.
156. On this basis, it is not considered that there is potential for LSE on any Annex I habitat features of Berwickshire and North Northumberland Coast SAC. Site specific sediment chemistry sampling across the Proposed Development array area and offshore export cable corridor is proposed to inform the EIA and, should the results demonstrate any significant offshore contamination of sediments, this will be revised in the RIAA.

Accidental Pollution

157. 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. 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), IMO (International Maritime Organization) and MARPOL (International Convention for the Prevention of Pollution from Ships) guidelines for preventing pollution at sea. It is however acknowledged that these plans have yet to be drafted and therefore the potential for LSE on Annex I habitat features of the Berwickshire and North Northumberland Coast SAC from accidental pollution cannot be discounted at this stage.

Operation and Maintenance Phase

Long-term Subtidal Habitat Loss

158. 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 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

159. 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

160. 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).
161. 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 offshore export cable corridor 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

162. 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 any Annex I features of the Berwickshire and North Northumberland Coast SAC which are within the ZOI (defined as 20 km; see section 4.1).
163. 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 export cable corridor 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

164. 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 which may be beneficial for benthic ecology. These structures may also facilitate the spread of marine INIS. There is, however, already a potential for marine INIS to occur due to the presence of other local offshore wind farms and major shipping lanes off the east coast of Scotland and it is considered that there is no additional risk posed by the Proposed Development. There is also no physical overlap between the Proposed Development and the site and so 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

165. The potential for LSE on any Annex I habitat features of Berwickshire and North Northumberland Coast SAC as a result of accidental pollution cannot be discounted at this stage. The justification is as presented previously in section 5.2.2 – Construction Phase: Accidental Pollution.

Decommissioning Phase

166. The impacts during the decommissioning phase are considered to be similar and potentially less than those outlined above in the construction phase (see section 5.2.2 – 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

167. 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 Berwickshire and North Northumberland Coast SAC as a result the removal of hard substrates.

5.2.3. DETERMINATION OF LSE FOR ANNEX I HABITATS

168. Table 5.2 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.

Table 5.2: LSE Matrix for Annex I Habitats of the Berwickshire and North Northumberland Coast SAC

European Site Qualifying Interest 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		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
Mudflats and sandflats not covered by seawater at low tide	x a	x a	x a	√ b	√ b	√ b	x c		x c		x d		x e		√ f		x g	
Large shallow inlets and bays	x a	x a	x a	√ b	√ b	√ b	x c		x c		x d		x e		√ f		x g	
Reefs	x a	x a	x a	√ b	√ b	√ b	x c		x c		x d		x e		√ f		x g	
Submerged or partially submerged sea caves	x a	x a	x a	√ b	√ b	√ b	x c		x c		x d		x e		√ f		x g	

a: **Temporary habitat loss/disturbance** – there will be no direct physical overlap between any of the activities associated with 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 offshore export cable corridor and, until the Proposed Development offshore cable corridor is refined, it is considered that there is potential for LSE on all Annex I habitat features of the site during offshore export cable corridor works only.

c: **Release of sediment bound contaminants** – the risk of sediment bound contaminants being present in the sediments to be disturbed in concentrations likely to be harmful to benthic receptors is considered to be low. 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** – 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 offshore export cable corridor only.
- g: **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.
- h: **Accidental pollution** – best practice approaches 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. It is however acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.
- 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 I habitat features of the SAC as a result of in-combination effects across all phases.

5.3. ASSESSMENT OF LSE FOR ANNEX II DIADROMOUS FISH

169. 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.

5.3.1. SITE OVERVIEWS

170. 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 Annex A for all sites.

Tweed Estuary SAC

171. 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 Atlantic salmon, 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

172. 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. Sea and river lamprey are also widespread within the site (JNCC, 2020b).

River South Esk SAC

173. 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).

174. 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 > 20 m². 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

175. 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

176. 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.
177. 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).

River Teith SAC

178. 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 the Atlantic salmon and although this species is a qualifying feature of the site, it is not a primary reason for its designation.

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

179. 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. 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 5.3.2.

Construction Phase

Temporary Habitat Loss / Disturbance

180. 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. As no European sites with Annex II diadromous fish species physically overlap with the Proposed Development (see Figure 4.2) 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

181. 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). As there are no sites within this ZOI, and given the highly mobile nature of migratory fish to be able to avoid areas of increased SSC, 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

182. 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 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. The nearest European site with Annex II diadromous fish qualifying interest features is located 49.7 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

183. 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. 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, IMO and MARPOL guidelines for preventing pollution at sea. It is, however, acknowledged

that these plans have yet to be drafted and therefore the potential for LSE on Annex II diadromous fish features of European sites from accidental pollution cannot be discounted at this stage.

Operation and Maintenance Phase

Temporary Habitat Loss / Disturbance

184. 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 as there is no physical overlap the Proposed Development and any European sites (see Figure 4.2), 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

185. 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). As there are no European sites within this ZOI, and given the highly mobile nature of migratory fish to be able to avoid areas of increased SSC, 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

186. 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 (Sigra 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. This is considered highly unlikely because of the highly mobile nature of diadromous fish species. 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 from further consideration out for all sites.

Long-term Habitat Loss

187. 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 as there is no physical overlap between the Proposed Development and any European sites (see Figure 4.2), 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)

188. 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.

Accidental Pollution

189. The potential for LSE on Annex II diadromous features of European sites as a result of accidental pollution cannot be discounted at this stage. The justification is as presented previously in section 5.3.2 - Construction Phase: Accidental Pollution.

Decommissioning Phase

190. 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 5.3.2 - Construction Phase) and have not been reiterated.

5.3.3. DETERMINATION OF LSE FOR ANNEX II DIADROMOUS FISH SPECIES

191. Table 5.3 to Table 5.8 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.

Table 5.3: 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			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
Atlantic salmon (<i>Salmo salar</i>)	x a	x a	x a	x b	x b	x b	✓ c	x c	✓ c		x d			✓ e		✓ f	✓ f	✓ f	✓ g	✓ g	✓ g
Sea lamprey (<i>Petromyzon marinus</i>)	x a	x a	x a	x b	x b	x b	✓ c	x c	✓ c		x d			✓ e		✓ f	✓ f	✓ f	✓ g	✓ g	✓ g
River lamprey (<i>Lampetra fluviatilis</i>)	x a	x a	x a	x b	x b	x b	✓ c	x c	✓ c		x d			✓ e		✓ f	✓ f	✓ f	✓ g	✓ g	✓ g

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 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 (49.7 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 transit 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 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 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 features of the site from EMF during the operation and maintenance phase.

f: **Accidental pollution** – best practice approaches 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. It is however acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.

g: **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 features of the SAC as a result of in-combination effects across all phases.

Table 5.4: 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				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	
Atlantic salmon (<i>Salmo salar</i>)	x a	x a	x a		x b	x b	x b		✓ c	x c	✓ c						✓ e				✓ f	✓ f	✓ f		✓ g	✓ g	✓ g	
Sea lamprey (<i>Petromyzon marinus</i>)	x a	x a	x a		x b	x b	x b		✓ c	x c	✓ c						✓ e				✓ f	✓ f	✓ f		✓ g	✓ g	✓ g	
River lamprey (<i>Lampetra fluviatilis</i>)	x a	x a	x a		x b	x b	x b		✓ c	x c	✓ c						✓ e				✓ f	✓ f	✓ f		✓ g	✓ g	✓ g	

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 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 (52.6 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 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: **Accidental pollution** – a best practice approaches 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. It is however acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.

g: **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 SAC as a result of in-combination effects across all phases.

Table 5.5: 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			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
Atlantic salmon (<i>Salmo salar</i>)	x a	x a	x a	x b	x b	x b	✓ c	x c	✓ c		x d			x e		✓ f	✓ f	✓ g	✓ g	✓ g	✓ g
Freshwater pearl mussel (<i>Margaritifera margaritifera</i>)	x a	x a	x a	x b	x b	x b	✓ c	x c	✓ c		x d			x e		✓ f	✓ f	✓ g	✓ g	✓ g	✓ g

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 (61.3 km from the Proposed Development array area) 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. However, due to the distance of the site from the Proposed Development (> 60 km) significant effects on the migration of Atlantic salmon to and from the site are considered unlikely. It is concluded that there is no potential for LSE on the Annex II species that are qualifying features of the site from EMF during the operation and maintenance phase.

f: **Accidental pollution** – best practice approaches 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. It is however acknowledged that these plans have yet to be drafted and therefore LSE on Atlantic salmon cannot be ruled out at this stage. 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: **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 species that are qualifying features of the SAC as a result of in-combination effects across all phases.

Table 5.6: 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			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
Atlantic salmon (<i>Salmo salar</i>)	x a	x a	x a	x b	x b	x b	✓ c	x c	✓ c		x d			x e		✓ f	✓ f	✓ g	✓ g	✓ g	✓ g
Sea lamprey (<i>Petromyzon marinus</i>)	x a	x a	x a	x b	x b	x b	✓ c	x c	✓ c		x d			x e		✓ f	✓ f	✓ g	✓ g	✓ g	✓ g
River lamprey (<i>Lampetra fluviatilis</i>)	x a	x a	x a	x b	x b	x b	✓ c	x c	✓ c		x d			x e		✓ f	✓ f	✓ g	✓ g	✓ g	✓ g

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 (75.0 km from the Proposed Development array area), 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 Annex II diadromous fish 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. However, due to the distance of the European site from the Proposed Development (> 65 km) significant effects on the migration of diadromous species to and from the site are unlikely. It is concluded that there is no potential for LSE on the Annex II diadromous fish qualifying interest features of the site from EMF during the operation and maintenance phase.

f: **Accidental pollution** – best practice approaches 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. It is however acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.

g: **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 SAC as a result of in-combination effects across all phases.

Table 5.7: 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		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
Atlantic salmon (<i>Salmo salar</i>)	x a	x a	x b	x b	✓ c	x c	✓ c	x d		x e	✓ f	✓ f	✓ g	✓ g
Freshwater pearl mussel (<i>Margaritifera margaritifera</i>)	x a	x a	x b	x b	✓ c	x c	✓ c	x d		x e	✓ f	✓ f	✓ g	✓ g

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 (77.7 km from the Proposed Development array area), 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. However, due to the distance of the site from the Proposed Development (> 75 km) significant effects on the migration of Atlantic salmon to and from the site are unlikely. It is concluded that there is no potential for LSE on the Annex II species that are qualifying features of the site from EMF during the operation and maintenance phase.

f: **Accidental pollution** – best practice approaches 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. It is however acknowledged that these plans have yet to be drafted and therefore LSE on Atlantic salmon cannot be ruled out at this stage. 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: **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 species that are qualifying features of the SAC as a result of in-combination effects across all phases.

Table 5.8: 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		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
Atlantic salmon (<i>Salmo salar</i>)	x a	x a	x b	x b	✓ c	x c	✓ c	x d		x e	✓ f	✓ f	✓ g	✓ g
Sea lamprey (<i>Petromyzon marinus</i>)	x a	x a	x b	x b	✓ c	x c	✓ c	x d		x e	✓ f	✓ f	✓ g	✓ g
River lamprey (<i>Lampetra fluviatilis</i>)	x a	x a	x b	x b	✓ c	x c	✓ c	x d		x e	✓ f	✓ f	✓ g	✓ g

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 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 (140.8 km from the Proposed Development array area), 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 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 Annex II diadromous fish 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. However, due to the distance of the site from the Proposed Development (> 90 km) significant effects on the migration of diadromous species to and from the site are unlikely. It is concluded that there is no potential for LSE on the Annex II diadromous fish qualifying interest features of the site from EMF during the operation and maintenance phase.

f: **Accidental pollution** – best practice approaches 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. It is however acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.

g: **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 features of the SAC as a result of in-combination effects across all phases.

5.4. ASSESSMENT OF LSE FOR ANNEX II MARINE MAMMALS

192. 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).

5.4.1. SITE OVERVIEWS

193. 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 Annex A for all sites, including the sites within other European Economic Area (EEA) states and which therefore constitute a potential transboundary impact and are not summarised in detail below.

Berwickshire and North Northumberland Coast SAC

194. The Berwickshire and North Northumberland Coast SAC is located approximately 36 km from the Proposed Development array area and 3 km from the offshore export cable corridor (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 SNH, 2020).

Isle of May SAC

195. The Isle of May SAC lies at the entrance to the Firth of Forth, approximately 54 km from the Proposed Development array area and 21 km from the offshore export cable corridor (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

196. The Firth of Tay and Eden Estuary SAC is located approximately 62 km from the Proposed Development array area and 45 km from the offshore export cable corridor (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

197. The Southern North Sea SAC is located approximately 146 km from the Proposed Development array area and 150 km from the offshore export cable corridor (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

198. The Moray Firth SAC in north-east Scotland is located approximately 218 km from the Proposed Development array area and 254 km from the offshore export cable corridor (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 130 individuals (Wilson et al. 1999). Dolphins are present all year round, and while they range widely in the Moray Firth, they appear to favour particular areas (JNCC, 2020i).

5.4.2. PATHWAYS FOR LSE: POTENTIAL IMPACTS ON MARINE MAMMALS

199. A list of potential impacts and effects on marine mammals that may result from the Proposed Development has been provided below (section 5.4.2 - 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 SNH, 2020; 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. 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 5.4.2.

Construction Phase

Underwater Noise from Piling

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

Harbour Porpoise

201. Harbour porpoise were the most regularly sighted marine mammal species (415 sightings) in the first year of the site-specific aerial surveys being undertaken to inform the EIA for the Proposed Development, with sightings throughout the survey area. Sightings were considerably higher in May 2019 (n=181) compared to other months (n=3-57) and generally sightings were lower in the winter months. These findings are consistent with the results of other studies in the area including the boat-based surveys for Seagreen Phase 1 and Seagreen Round 3, and TCE aerial surveys (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 km² (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).
202. 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

203. 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 195 individuals (95% Highest Posterior Density Intervals (HPDI): 162 to 253) based on photo-ID counts between 2006 and 2007 (Cheney *et al.*, 2013) although recent population growth suggests that the current population size is likely to be larger than this (Cheney *et al.*, 2018). 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 a single bottlenose dolphin sighting was recorded during the first year of the site-specific aerial surveys being undertaken to inform the EIA for the Proposed Development and SCANS III density estimate for the block coinciding with the Proposed Development (Block R) is 0.030 Bottlenose dolphin per km² (CV 0.86; Hammond *et al.*, 2017).
204. 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

205. 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.
206. No harbour seals were sighted in the first year of the site-specific aerial surveys being undertaken to inform the EIA for the Proposed Development. There were however, 142 sightings of unknown 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 km² (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 2017 (see Annex B). The analysis demonstrated that harbour seal movements are mostly coastal with little overlap with the Proposed Development (see Annex B). 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 Annex B).
207. 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

208. 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).
209. A total of 56 grey seals were sighted in the first year of the site-specific aerials surveys being undertaken to inform the EIA for the Proposed Development. In addition, there were 142 sightings of unknown seal species which, given the at-sea usage data for the Proposed Development which suggests a maximum density of 1.896 seals per km² (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 between 1990 and 2016 show a large amount of overlap with grey seal movements and the Proposed Development (see Annex B). The telemetry data also suggest potential connectivity with the Isle of May SAC and the Berwickshire and North Northumberland Coast SAC (see Annex B).
210. 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).

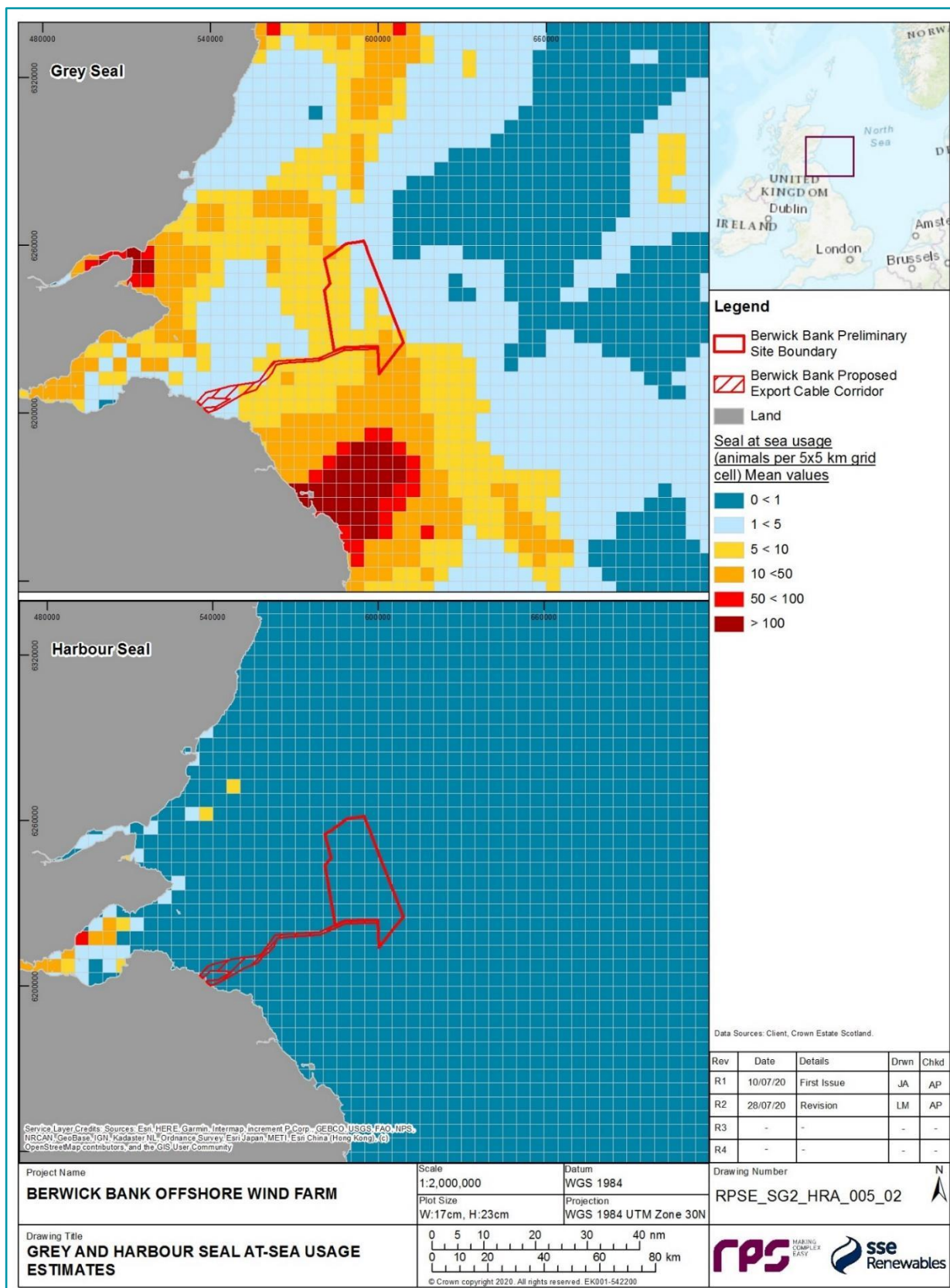


Figure 5.1: Grey (top) and Harbour (bottom) Seal At-sea Usage Estimates

Underwater Noise from Vessels

212. 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

213. 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. Given the distance of the nearest European site for harbour porpoise from the Proposed Development (146 km for the Southern North Sea SAC) and that the uplift in vessel traffic will be small compared with existing baseline levels, 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

214. As above for harbour porpoise, the majority of vessel movements associated with the Proposed Development will likely be to/from local ports on the east coast of Scotland and the uplift in vessel traffic will be small compared to baseline conditions. Given the distance of the Moray Firth SAC from the Proposed Development (218 km to the array area), it is considered that the increase in vessel traffic 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

215. 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 offshore export cable corridor. The nearest harbour seal haul out sites are located in the Firth of Forth (SCOS, 2019). There are two designated haul out sites for harbour seals: Kinghorn Rocks, and Inchmickery and Cow and Calves, both of which are located > 40 km from the proposed offshore export cable corridor landfall options.
216. 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 therefore the potential for vessel movements to result in disturbance to the harbour seal feature of the Firth of Tay and Eden Estuary SAC.

Grey Seal

217. 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 Annex B). It is therefore considered that there is the potential for vessel movements associated with the construction of the Proposed Development to result in disturbance to grey seal.
218. In the east Scotland SMA there are three designated seasonal haul out sites for grey seals: Fast Castle, Inchkeith and Craighleith (see Figure 5.2). The closest of these designated

seasonal haul outs is Fast Castle, which is located within 2 km of the Thortonloch Landfall, and ~5.5 km from the Skateraw Landfall (Figure 5.2). There is therefore the potential for vessel movements associated with nearshore works to result in disturbance to hauled out grey seals at these locations.

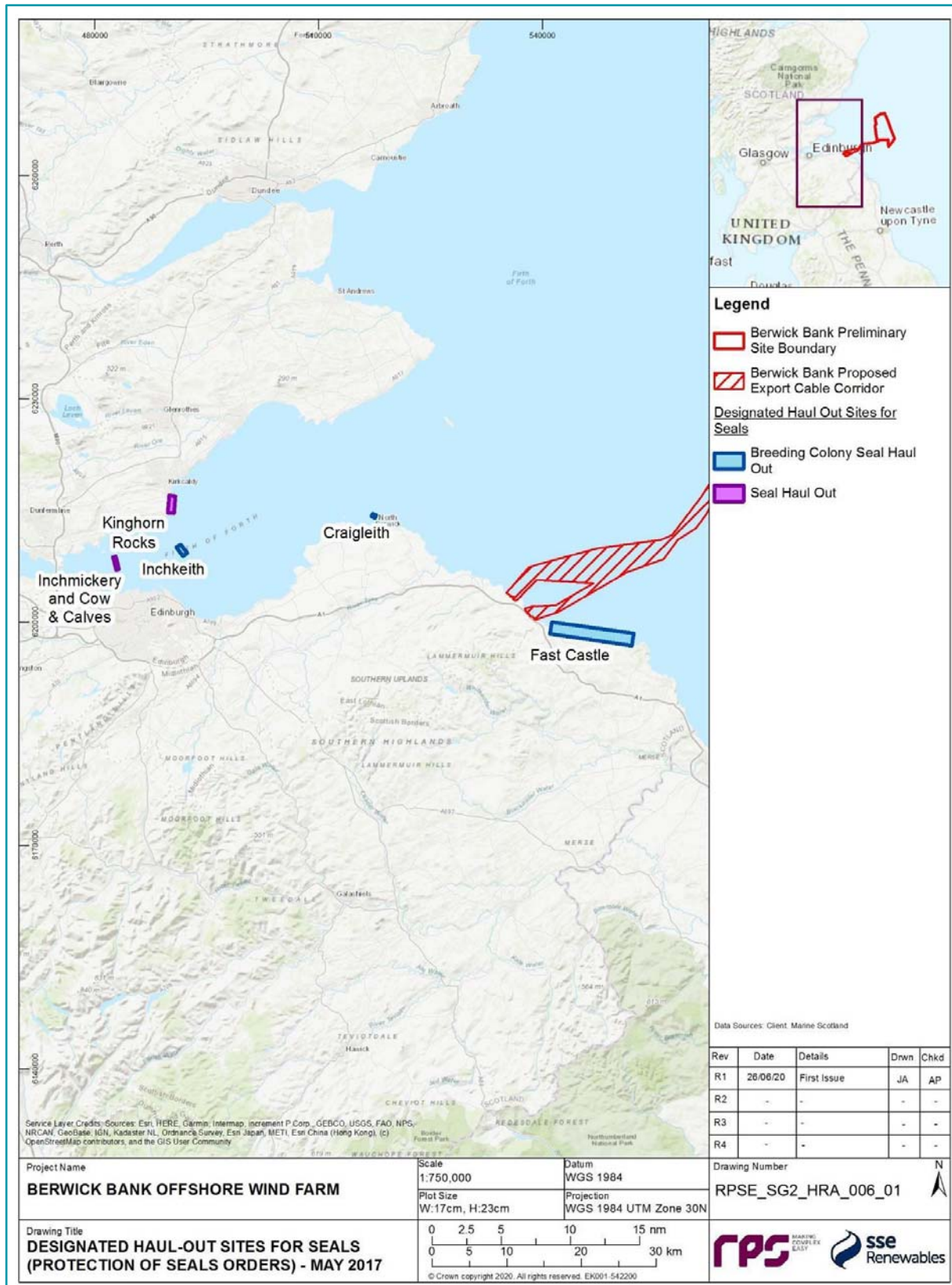


Figure 5.2: Designated Haul Out Sites for Grey and Harbour Seal in the East Scotland Seal Management Area

Vessel Collision Risk

220. 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

221. The construction of the Proposed Development is likely to result in a relatively small increase in vessel traffic compared to current background levels. 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 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

222. 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

223. 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 but telemetry data indicate that harbour seals make short foraging trips to/from the Firth of Tay (see Annex B). 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 construction 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 the potential for collision risk for harbour seals moving within and to/from the Firth of Tay. On this basis, there is considered to be potential for LSE on the harbour seal qualifying feature of the Firth of Tay and Eden Estuary SAC.

Grey Seal

224. 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 haulouts, 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 and not all grey seals in the Proposed Development array area will be at risk of collision. The Advice on Operations for the SACs screened in (e.g. Natural England and SNH, 2020) 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).

225. Given the overlap between the Proposed Development and potential foraging grounds for grey seal, there is considered to be potential for LSE on the grey seal qualifying feature of the Berwickshire and North Northumberland Coast SAC and Isle of May SAC from vessel collision risk.

Changes in Prey Availability

226. 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, 2020).

Harbour Porpoise

227. 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. In addition, given the distance of the Proposed Development from the Southern North Sea SAC (146 km from the Proposed Development array area and 150 km from the proposed offshore export cable corridor), any potential effect on harbour porpoise is unlikely to be significant and this impact is screened out of further consideration for harbour porpoise.

Bottlenose Dolphin

228. 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. This impact is therefore screened out of further consideration for bottlenose dolphin.

Harbour Seal

229. 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. Any temporary effects to fish populations during construction are therefore unlikely to result in a likely significant effect for harbour seal. This impact is *therefore screened out of further consideration for harbour seal.*

Grey Seal

230. The Proposed Development is likely to overlap with foraging grounds for grey seal (see Figure 5.1 and Annex B) 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

231. 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 above 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

232. 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

233. As above for harbour porpoise, bottlenose dolphin 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

234. 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 bottlenose dolphin and therefore this impact is screened out of further consideration for this species.

Grey Seal

235. 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

236. There is the potential for pollution to be accidentally released during the construction phase of the Proposed Development from 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 are likely to 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. It will also set out industry good practice and OSPAR, IMO and MARPOL guidelines for preventing pollution at sea. It is, however, acknowledged that these plans have yet to be drafted and therefore the potential for LSE on marine mammal features of European sites from accidental pollution cannot be discounted at this stage.

Operation and Maintenance Phase

Underwater Noise from Vessels

237. Disturbance of marine mammals may arise during the operation and maintenance phase from increased vessel traffic 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

238. 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 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

239. The nearest SAC for bottlenose dolphin is the Moray Firth SAC, located 177 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 therefore this impact is screened out of further consideration for this species.

Harbour Seal

240. 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 Annex B). There is therefore the potential for vessel movements to result in disturbance to the harbour seal feature of the Firth of Tay and Eden Estuary SAC.

Grey Seal

241. 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 offshore export cable corridor landfall options (i.e. within 2 km of the Thortonloch 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 to result in a disturbance to grey seals.

Vessel Collision Risk

242. 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

243. 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

244. 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

245. 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 location of the operation and maintenance port(s) to be used in support of the Proposed Development is not currently confirmed, although it is likely that the majority of operation and maintenance vessel movements will be to/from local ports on the east coast of Scotland. Should any ports be located within the Firth of Tay, however, there is the potential for interaction between vessels and harbour seals using the Firth of Tay. There is therefore the potential for collision risk to the harbour seal features of the Firth of Tay and Eden Estuary SAC.

Grey Seal

246. 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 location of the operation and maintenance port(s) 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. The Advice on Operations for the SACs (e.g. Natural England and SNH, 2020) 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).

247. Given the overlap between the Proposed Development and potential foraging grounds for grey seal, there is considered to be potential for LSE on the grey seal qualifying feature of the Berwickshire and North Northumberland Coast SAC and Isle of May SAC from vessel collision risk.

Changes in Prey Availability

248. 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

249. 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 addition, given the distance of the Proposed Development from the nearest harbour porpoise SAC (Southern North Sea SAC located 146 km to the south of the Proposed Development array area and 150 km from the proposed offshore export cable corridor), any potential effect on harbour porpoise is considered unlikely to be significant and so this impact is screened out of further consideration for this species.

Bottlenose Dolphin

250. 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. This impact is therefore screened out of further consideration for this species.

Harbour Seal

251. 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. This impact is screened out of further consideration for this species.

Grey Seal

252. The Proposed Development is likely to overlap with foraging grounds for grey seal (see Figure 5.1 and Annex B) 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. This impact is screened out of further consideration for this species.

Operational Noise

253. 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

254. 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

255. 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

256. Several published studies provide evidence that harbour seal 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

257. As above 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 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

258. 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

259. The potential for LSE on Annex II marine mammal features of European sites as a result of accidental pollution cannot be discounted at this stage. The justification is as presented previously in section 5.4.2 – Construction Phase: Accidental Pollution.

Decommissioning Phase

260. The impacts during the decommissioning phase are considered to be similar and potentially less than those outlined above in the construction phase (section 5.4.2 – Construction Phase).

5.4.3. DETERMINATION OF LSE FOR MARINE MAMMALS

261. Table 5.9 to Table 5.14 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 5.14) has been produced to cover the 20 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.
262. 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.

Table 5.9: 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 Vessels		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
Grey seal	√a		√b	√b	√c	√c	√d	xd	xe		xf		xg		√h	√h	√i	√i

- a: **Underwater noise from piling** – telemetry data indicates potential connectivity between the Proposed Development and this SAC. The Proposed Development is located 36 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. There is therefore considered to be potential for LSE from underwater noise during construction.
- b: **Underwater noise from vessels** – 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 within the SAC are in close proximity to the proposed offshore export cable corridor, and the nearest designated haul out (Fast Castle) is within 2 km of the Thortonloch Landfall. There is therefore considered to be potential for LSE from vessel noise across all phases of the Proposed Development.
- c: **Vessel collision risk** – 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 within the SAC are in close proximity to the proposed offshore export cable corridor, and the nearest designated haul out (Fast Castle) is within 2 km of the Thortonloch Landfall. There is therefore considered to be 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 during the construction phase. Given the reduced impacts to fish communities across all other phases of the Proposed Development, it is concluded that there is no potential for LSE from changes to prey during the operation and maintenance and decommissioning phases.

- 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** – best practice approaches will be implemented as part of the Proposed Development through post-consent plans (e.g. the PEMMP) to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development. It is, however, acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.
- 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.

Table 5.10: LSE Matrix for Marine Mammal Features of the Isle of May SAC

European Site Qualifying Interest Features	Underwater Noise from Piling		Underwater Noise from Vessels		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
Grey seal	✓a		✓b	✓b	✓c	✓c	✓d	xd	xe	xe	xf		xg		✓h	✓h	✓i	✓i

- a: **Underwater noise from piling** – telemetry data indicates potential connectivity between the Proposed Development and this SAC. The Proposed Development is located 54 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. There is therefore considered to be potential for LSE from underwater noise during construction.
- b: **Underwater noise from vessels** – 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 offshore export cable corridor. 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** – 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 within the SAC are in close proximity to the proposed offshore export cable corridor. There is therefore considered to be 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 during the construction phase. Given the reduced impacts to fish communities across all other phases of the Proposed Development, it is concluded that there is no potential for LSE from changes to prey during the operation and maintenance and decommissioning phases.
- 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** – best practice approaches 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. It is however acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.
- 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.

Table 5.11: 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 Vessels		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
Harbour seal	√a		√b	√b	√b	√c	√c	√c	xe	xe	xf		xg		√h	√h	√i	√i

a: **Underwater noise from piling** – 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. There is therefore considered to be potential for LSE from underwater noise during construction.

b: **Underwater noise from vessels** - 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 landfill 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** - 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 landfill option but harbour seal make foraging trips to/from the Firth of Tay. Should construction ports be located within the Firth of Tay then there is the potential for vessel movements associated with the construction of the Proposed Development, and therefore vessel collision risk, to overlap with harbour seal movements within and to/from the Firth of Tay and Eden Estuary SAC. There is therefore considered to be the potential for LSE from collision risk associated with vessel movements.

d: **Changes in prey availability** - 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. Any temporary effects to fish populations during construction are therefore unlikely to result in a significant effect for harbour seal and impacts to fish communities during the operation and maintenance and decommissioning phases will be substantially less. It is therefore concluded that there is no 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** – best practice approaches 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. It is however acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.
- 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.

Table 5.12: LSE Matrix for Marine Mammal Features of the Southern North Sea SAC

European Site Qualifying Interest Features	Underwater Noise from Piling		Underwater Noise from Vessels		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
Harbour porpoise	√a		x _b	x _b	x _c	x _c	x _d	x _d	x _e		x _f		x _g		√h	√h	√i	√i

a: **Underwater noise from piling** – 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. There is therefore considered to be potential for LSE from underwater noise during construction.

b: **Underwater noise from vessels** - given the distance of the site from the Proposed Development (>146 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 to 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** – 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. In addition, given the distance of the Proposed Development from this site (146 km from the Proposed Development array area and 150 km from the proposed offshore export cable corridor) 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 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** – best practice approaches 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. It is however acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.
- 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.

Table 5.13: LSE Matrix for Marine Mammal Features of the Moray Firth SAC

European Site Qualifying Interest Features	Underwater Noise from Piling		Underwater Noise from Vessels		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
Bottlenose dolphin	√a		x _b	x _b	x _c	x _c	x _d	x _d	x _e		x _f		x _g		√h	√h	√i	√i

- a: **Underwater noise from piling** – 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. There is therefore considered to be potential for LSE from underwater noise during construction
- b: **Underwater noise from vessels** - given the distance of the site from the Proposed Development (218 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 to 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** - bottlenose dolphin predominantly occur in coastal areas and abundance of this species in the Proposed Development array area is likely to be low, therefore any potential temporary changes to the fish community in the vicinity of the Proposed Development array area are unlikely to result in significant effects to bottlenose dolphin given the potential for foraging opportunities in the wider area. It is concluded that there is no 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 that 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** – best practice approaches 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. It is however acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.
- 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.

Table 5.14: LSE Matrix for the 20 Transboundary Harbour Porpoise Sites

European Site Qualifying Interest Features	Underwater Noise from Piling		Underwater Noise from Vessels		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
Harbour porpoise	x a		x b	x b	x b	x c	x c	x d	x d	x e		x f		x g	x h	x h	x i	x j

a: **Underwater noise from piling** - 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 from construction noise.

b: **Underwater noise from vessels** - 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. 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** – given the significant distance of the nearest transboundary site to the Proposed Development (closest site is located 292 km from the Proposed Development array area), the Proposed Development is unlikely to constitute important foraging grounds for individuals from these sites and an accidental spill, should it occur, is unlikely to result in significant effects on the harbour porpoise features of these sites. It can therefore be concluded that there is no potential for LSE on the Annex II harbour porpoise feature of any transboundary site as a result of accidental pollution.
- f: **In-combination effects** – on the basis that there is considered to be no potential for LSE as a result of the Proposed Development alone, 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

263. A total of 41 European sites were identified in the initial screening process (section 4.4.1) to be taken forward for determination of LSE. These sites are listed below by ornithological features (i.e. seabirds and migratory waterbird)s and are given in order of increasing distance from the Proposed Development as detailed in Table 4.5:

- Seabirds
 - Outer Firth of Forth and St Andrews Bay Complex pSPA;
 - St Abb's Head to Fastcastle SPA;
 - Northumberland Marine SPA;
 - Farne Islands SPA;
 - Forth Islands SPA;
 - Fowlsheugh SPA;
 - Buchan Ness to Collieston Coast SPA;
 - Troup, Pennan and Lion's Heads SPA;
 - East Caithness Cliffs SPA;
 - Flamborough and Filey Coast SPA;
 - North Caithness Cliffs SPA;
 - Copinsay SPA;
 - Hoy SPA;
 - Calf of Eday SPA;
 - Rousay SPA;
 - West Westray SPA;
 - Fair Isle SPA;
 - Sule Skerry and Sule Stack SPA;
 - Cape Wrath SPA;
 - Sumburgh Head SPA;
 - Foula SPA;
 - Handa SPA;
 - Noss SPA;
 - North Rona and Sula Sgeir SPA;
 - Fetlar SPA;
 - Shiant Isles SPA; and
 - Hermaness, Saxa Vord and Valla Field SPA.
- Migratory waterbirds (estuarine sites)
 - Firth of Forth SPA and Ramsar site;
 - Montrose Basin SPA and Ramsar site;
 - Firth of Tay and Eden Estuary SPA and Ramsar site;
 - Ythan Estuary, Sands of Forvie and Meikle Loch SPA and Ramsar site;
- Migratory waterbirds (inland waterbody roost sites)
 - Greenlaw Moor SPA and Ramsar site;
 - Cameron Reservoir SPA and Ramsar site;
 - Din Moss - Hoselaw Loch SPA and Ramsar site;
 - Fala Flow SPA and Ramsar site;
 - Loch of Kinnordy SPA and Ramsar site;
 - Gladhouse Reservoir SPA and Ramsar site;
 - Loch Leven SPA and Ramsar site;
 - South Tayside Goose Roosts SPA and Ramsar Site, Westwater SPA and Ramsar site;
 - Slamannan Plateau SPA.

264. No transboundary European sites were identified in the initial screening process to be taken forward for determination of LSE.

5.5.1. SITE OVERVIEWS

265. 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.

Outer Firth of Forth and St Andrews Bay Complex pSPA

266. The proposed SPA stretches from Arbroath to St Abb's Head and encompasses the Firth of Forth, the outer Firth of Tay and St Andrews Bay. It provides protection to important wintering grounds used for feeding, moulting and roosting by eight species of non-breeding inshore waterfowl (divers, grebes and seaduck). It is also notable for its concentrations of four species of wintering gulls, which together with non-breeding populations of kittiwake, guillemot, shag and razorbill, contribute to an assemblage of over 40,000 seabirds.
267. The site also encompasses feeding grounds for a major assemblage of over 100,000 seabirds (SNH and JNCC, 2016) nesting at SPA colonies surrounding the pSPA.

St Abb's Head to Fastcastle SPA

268. St Abb's Head to Fast Castle SPA comprises an area of sea cliffs and coastal strip stretching over 10 km along the Berwickshire Coast north of St Abbs. It supports an important assemblage of breeding seabirds. The seaward extension extends approximately 1 km into the marine environment to include the seabed, water column and surface (SNH, 2009a). Qualifying interest features within foraging range of the Proposed Development array area are: breeding guillemot, herring gull, kittiwake, razorbill and seabird assemblage.

Northumberland Marine SPA

269. The Northumberland Marine SPA is located on the Northumberland coast between Blyth and Berwick-Upon-Tweed. It is designated to provide additional protection to breeding seabirds in the marine waters adjacent to their breeding colonies. The coastal parts of the site consist of sandy bays separated by rocky headlands backed by dunes or soft and hard cliffs. There are extensive areas of inter-tidal rocky reef, long sandy beaches and extensive sand and mud flats. Discrete areas of intertidal mudflats and estuarine channels are also included. The open coast habitats extend into the subtidal zone, where large shallow inlets and bays and extensive rocky reefs are present. Further offshore, soft sediments predominate. The seaward boundary extends up to 18 km out to sea on the basis of an analysis which identified areas of sea with the characteristics typical of areas used most heavily for foraging by breeding terns at existing colonies at the Northumbria Coast, Farne Islands and Coquet Islands SPAs (Natural England, 2016). Qualifying interest features within foraging range of the Proposed Development array area are: breeding Arctic tern, guillemot, puffin, and seabird assemblage.

Farne Islands SPA

270. The Farne Islands are a group of low-lying islands between 2 and 6 km off the coast of Northumberland. They form the easternmost outcroppings of the Great Whin Sill of quartz dolerite, and although some islands retain cappings of boulder clay or peaty deposits, vegetation is limited to pioneer communities. Vegetation is further affected by the maritime conditions and large numbers of seabirds. The islands are important as nesting areas for these birds, especially terns, gulls and auks. The seabirds feed outside the SPA in nearby waters, as well as more distantly in the North Sea (Natural England, 2014). Qualifying

interest features within foraging range of the Proposed Development array area are: breeding guillemot and seabird assemblage.

Forth Islands SPA

271. The Forth Islands SPA supports the main seabird colonies in the Forth of Forth. The SPA comprises the islands of Inchmickery, Isle of May, Fidra, The Lamb, Craigleith, Bass Rock and Long Craig. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2018a). Qualifying interest features within foraging range of the Proposed Development array area are: breeding gannet, guillemot, herring gull, kittiwake, lesser black-backed gull, puffin, razorbill and seabird assemblage.

Fowlsheugh SPA

272. Fowlsheugh SPA supports an important breeding seabird colony, located 4 km south of Stonehaven on the east coast of Aberdeenshire. It is a stretch of sheer cliffs, between 30 m and 60 m high. The seaward extension extends 2 km into the marine environment and includes the seabed, water column and surface (SNH, 2009b). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar, guillemot, herring gull, kittiwake, razorbill and seabird assemblage.

Buchan Ness to Collieston Coast SPA

273. The Buchan Ness to Collieston Coast SPA is a 15 km stretch of south-east facing sea cliffs along the Aberdeenshire coast. The cliffs support large colonies of breeding seabirds and comprise varied coastal vegetation on the ledges and the cliff tops including maritime heath, grassland and brackish flushes. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2009c). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar, guillemot, kittiwake and seabird assemblage.

Troup, Pennan and Lion's Heads SPA

274. The Troup, Pennan and Lion's Heads SPA is a 9 km stretch of sea cliffs along the Aberdeenshire coast. The cliffs support large colonies of breeding seabirds. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2009d). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar, guillemot, kittiwake, razorbill and seabird assemblage.

East Caithness Cliffs SPA

275. East Caithness Cliffs SPA is of special nature conservation and scientific importance within Britain and the European Community for supporting very large populations of breeding seabirds. It includes most of the sea-cliff areas between Wick and Helmsdale on the north-east coast of the Scottish mainland. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2017). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar, kittiwake and seabird assemblage.

Flamborough and Filey Coast SPA

276. Flamborough and Filey Coast SPA is located on the Yorkshire coast between Bridlington and Scarborough. It supports an assemblage of over 200,000 breeding seabirds. It includes the RSPB reserve at Bempton Cliffs, the Yorkshire Wildlife Trust Flamborough Cliffs nature reserve and the East Riding of Yorkshire Council Flamborough Head Local Nature Reserve (LNR). The cliffs of Flamborough Head rise to 135 m and are composed of chalk and other sedimentary rocks. The adjacent sea out to 2 km off Flamborough Head as well as Filey Brigg to Cunstone Nab is characterised by reefs supporting kelp forest communities in the shallow subtidal and faunal turf communities below 2 m water depths (Natural England, 2020). Qualifying interest features within foraging range of the Proposed Development array area are: breeding gannet, kittiwake and seabird assemblage.

North Caithness Cliffs SPA

277. North Caithness Cliffs SPA is of special nature conservation and scientific importance within Britain and the European Community for supporting very large populations of breeding seabirds. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2018b). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar, kittiwake, puffin and seabird assemblage.

Copinsay SPA

278. The Copinsay SPA comprises a group of islands 4 km off the east coast of the Orkney Mainland. The islands have a cliffed rocky coastline, and maritime vegetation that support large colonies of breeding seabirds. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2009f). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar, kittiwake and seabird assemblage.

Hoy SPA

279. Hoy SPA covers the northern and western two-thirds of Hoy island which is located at the south-western end of the Orkney Islands. The SPA supports an extremely diverse mixture of mire, heath and alpine vegetation and Britain's most northerly native woodland. These upland areas and the high sea cliffs at the coast support an important assemblage of moorland breeding birds and breeding seabirds. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2009e). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar, kittiwake and seabird assemblage.

Calf of Eday SPA

280. Calf of Eday SPA is a small maritime island to the north of Eday in Orkney. Calf of Eday has a rocky shoreline with cliffs to the north and the west. The island is covered by maritime heath and grassland and regularly supports a breeding assemblage in excess of 20,000 individual seabirds. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2009j). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar and seabird assemblage.

Rousay SPA

281. Rousay is an island off the north-east coast of Mainland, Orkney. The SPA consists of sea cliffs and areas of maritime heath and grassland in the northwest and northeast of the island, supporting large a breeding assemblage in excess of 20,000 individual seabirds. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2009i). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar and seabird assemblage.

West Westray SPA

282. West Westray SPA is an 8 km stretch of sea cliffs, together with adjacent grassland and heathland, along the west coast of the island of Westray in Orkney. The cliffs support large colonies of breeding auks and kittiwakes while the grassland and heathland areas support breeding colonies of skuas and terns. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2009m). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar and seabird assemblage.

Fair Isle SPA

283. Fair Isle is an Old Red Sandstone island, the most southerly of the Shetland group, lying halfway between the Shetland Mainland and Orkney. It has a rocky, cliff coastline with adjacent coastal waters, heather moorland, acidic grassland, maritime grassland and crofting in-bye. Fair Isle SPA supports an internationally important assemblage of breeding seabirds in excess of 20,000 individuals, as well as populations of European importance of the Fair Isle wren. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2009o). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar, gannet and seabird assemblage.

Sule Skerry and Sule Stack SPA

284. Sule Skerry and Sule Stack are isolated islets 60 km west of Mainland, Orkney. Sule Skerry is larger, low-lying and vegetated whereas Sule Stack is a higher, bare rock stack with no vascular plants. The boundary SPA regularly supports 100,000 breeding seabirds, including European and Leach's storm-petrel. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2009n). Qualifying interest features within foraging range of the Proposed Development array area are: breeding gannet and seabird assemblage.

Cape Wrath SPA

285. Cape Wrath SPA covers two stretches of Torridonian sandstone and Lewisian gneiss cliff around Cape Wrath headland in north west Scotland. These cliffs support large colonies of breeding seabirds. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2009h). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar and seabird assemblage.

Sumburgh Head SPA

286. Sumburgh Head SPA covers an area of cliffs and boulder beaches at the southern tip of Mainland, Shetland. It regularly supports an assemblage of 35,000 breeding seabirds. The

seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2009p). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar and seabird assemblage.

Foula SPA

287. Foula is the most westerly of the Shetland Islands which are situated to the north of the Scottish mainland and Orkney. It lies 20 km west of Shetland Mainland. Foula SPA consists of a rocky coastline, large areas of mire, and adjacent coastal waters which support internationally important breeding populations of seabirds. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2009r). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar, great skua and seabird assemblage.

Handa SPA

288. Handa SPA consists of an island surrounded by high sea-cliffs and adjacent coastal waters lying a short distance from the west coast of Sutherland in Scotland. It provides a strategic nesting locality for seabirds that feed in the productive waters of the northern Minch, outside the SPA. Most of the island is vegetated with sub-maritime grasslands and heaths. The SPA's principal ornithological importance is for its breeding seabirds, regularly supporting 200,000 individuals. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2009g). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar and seabird assemblage.

Noss SPA

289. Noss SPA is an offshore island lying 5 km east of Lerwick, Shetland. It supports internationally important populations of over 35,000 breeding seabirds on cliffs and also on inland heathlands and grasslands. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2009s). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar, gannet and seabird assemblage.

North Rona and Sula Sgeir SPA

290. The North Rona and Sula Sgeir SPA comprises the two eponymous uninhabited islands, together with several outlying rocky islets and adjacent waters, 65 km north of Lewis. The coastlines of both islands consist mainly of cliffs except for two low-lying peninsulars on North Rona. The SPA regularly supports 130,000 breeding seabirds, including European and Leach's storm-petrel. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2009q). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar, gannet and seabird assemblage.

Fetlar SPA

291. Fetlar is an island in the Shetland group, lying to the east and south respectively of the larger islands of Yell and Unst. The species-rich heath, bog and mire communities on the island support an important and characteristic breeding bird community, with the cliffs, rocky shores, and adjacent coastal waters important for breeding seabirds. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and

surface (SNH, 2009t). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar and seabird assemblage.

Shiant Isles SPA

292. The four islands comprising the Shiant Isles SPA, with their skerries, are situated in The Minch, 6 km east of Harris in the Western Isles of Scotland. They support 200,000 seabirds, as well as an internationally important population of wintering barnacle geese. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2009k). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar and the seabird assemblage.

Hermaness, Saxa Vord and Valla Field SPA

293. Hermaness, Saxa Vord and Valla Field SPA lies in the north-west corner of the island of Unst, Shetland. It consists of 100-200 m high sea cliffs and adjoining areas of grassland, heath and blanket bog. The SPA supports international important populations of breeding seabirds (157,000 individuals) and red-throated diver. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface (SNH, 2009u). Qualifying interest features within foraging range of the Proposed Development array area are: breeding fulmar, gannet and seabird assemblage.

Firth of Forth SPA (and Ramsar site)

294. The Firth of Forth SPA is a complex of estuarine and coastal habitats in south east Scotland stretching from Alloa, to the coasts of Fife and East Lothian. The site includes extensive invertebrate-rich intertidal flats and rocky shores, areas of saltmarsh, lagoons and sand dune. The SPA citation quotes a winter peak-mean count (1992/93 – 1996/97) of 95,000 waterbirds, comprising 45,000 wildfowl and 50,000 waders, as well as Sandwich tern on passage (SNH, 2018c). As this SPA is located relatively near to the Proposed Development (approximately 55 km from the Proposed Development array area and 6 km from the proposed offshore export cable corridor) which could intersect a migratory pathway, all qualifying interest features are taken forward for determination of LSE: non-breeding bar-tailed godwit, common scoter, cormorant, curlew, dunlin, eider, golden plover, goldeneye, great crested grebe, grey plover, knot, lapwing, long-tailed duck, mallard, oystercatcher, pink-footed goose, red-breasted merganser, red-throated diver, redshank, ringed plover, scaup, shelduck, Slavonian grebe, turnstone, velvet scoter, wigeon and waterfowl assemblage, and passage Sandwich tern.

Montrose Basin SPA (and Ramsar site)

295. Montrose Basin SPA contains the enclosed estuary of the River South Esk on the east coast of Scotland, and Dun's Dish, a small eutrophic loch 4 km northwest of the Basin. It contains areas of mudflat, marsh and agricultural land and supports a diverse assemblage of wintering waterfowl of outstanding nature conservation and scientific importance. The SPA citation quotes a winter peak-mean count (1987/88 – 1991/92) of 47,640 waterbirds, comprising 33,450 wildfowl and 14,190 waders (SNH, 2018d). As the Proposed Development array area could intersect a migratory pathway associated with this SPA, all qualifying interest features are taken forward for determination of LSE: non-breeding dunlin, eider, greylag goose, knot, oystercatcher, pink-footed goose, redshank, shelduck, wigeon and waterfowl assemblage.

Firth of Tay and Eden Estuary SPA (and Ramsar site)

296. The Firth of Tay and Eden Estuary SPA is a complex of estuarine and coastal habitats in eastern Scotland from the mouth of the River Earn in the inner Firth of Tay, east to Barry

Sands on the Angus coast and St Andrews on the Fife coast. For much of its length the main channel of the estuary lies close to the southern shore and the most extensive intertidal flats are on the north side, west of Dundee. In Monifieth Bay, to the east of Dundee, the substrate becomes sandier and there are also mussel beds. The south shore consists of fairly steeply shelving mud and shingle. The Inner Tay Estuary is particularly noted for the continuous dense stands of common reed along its northern shore. These reedbeds, inundated during high tides, are amongst the largest in Britain. Eastwards, as conditions become more saline, there are areas of saltmarsh, a relatively scarce habitat in eastern Scotland. The SPA citation quotes a winter peak-mean count (1992/93 – 1996/97) of 48,000 waterbirds, comprising 28,000 wildfowl and 20,000 waders, as well as breeding marsh harrier and little tern (SNH, 2018e). As the Proposed Development array area could intersect a migratory pathway associated with this SPA, all migratory non-breeding qualifying interest features are taken forward for determination of LSE: non-breeding bar-tailed godwit, common scoter, cormorant, dunlin, eider, goldeneye, goosander, grey plover, greylag goose, Icelandic black-tailed godwit, long-tailed duck, oystercatcher, pink-footed goose, red-breasted merganser, redshank, sanderling, shelduck, velvet scoter and waterfowl assemblage.

Ythan Estuary, Sands of Forvie and Meikle Loch SPA (and Ramsar site)

297. Ythan Estuary, Sands of Forvie and Meikle Loch SPA covers a complex area in the north east of Scotland that contains the long, narrow estuary of the River Ythan, the Sands of Forvie on the east bank of the estuary and the eutrophic Meikle Loch. The SPA citation quotes a winter peak-mean count (1988/89 – 1992/93) of 26,400 waterbirds, comprising 18,400 wildfowl and 18,000 waders, as well as breeding common tern, little tern and Sandwich tern (SNH, 1994a). As the Proposed Development array area could intersect a migratory pathway associated with this SPA, all migratory non-breeding qualifying interest features are taken forward for determination of LSE: non-breeding eider, lapwing, pink-footed goose, redshank and waterfowl assemblage.

Greenlaw Moor SPA (and Ramsar site)

298. The Greenlaw Moor SPA is located in the southern Lammermuir Hills. The site includes two pools surrounded by an area of moorland. It is an important roosting area for pink-footed geese in winter, as well as being of interest for its overall assemblage of a number of other wintering swans, geese and ducks and breeding birds of prey (SNH, 1994b). As the Proposed Development array area could intersect a migratory pathway associated with this SPA, the non-breeding qualifying interest feature of the site is taken forward for determination of LSE: non-breeding pink-footed goose.

Cameron Reservoir SPA (and Ramsar site)

299. Cameron Reservoir SPA is a mesotrophic reservoir with a grassland and willow Salix carr fringe, covering 64.4 ha in Fife. The site is of international importance for its wintering pink-footed geese, with a winter peak-mean count (1986/87 – 1990/91) of 6,760 birds (SNH, 1994c). As the Proposed Development array area could intersect a migratory pathway associated with this SPA, the non-breeding qualifying interest feature of the site is taken forward for determination of LSE: non-breeding pink-footed goose.

Din Moss – Hoselaw Loch SPA (and Ramsar site)

300. Din Moss – Hoselaw Loch SPA lies approximately 7.5 km south-east of Kelso in the Scottish Borders. Hoselaw Loch is a shallow, eutrophic loch lying at mid-altitude (approximately 180 m above sea level). The site is of international importance for its wintering geese, with an average of 1,650 pink-footed geese and 3,500 greylag geese (SNH, 1988). As the Proposed Development array area could intersect a migratory pathway associated with this SPA, the

non-breeding qualifying interest features of the site are taken forward for determination of LSE: non-breeding greylag goose and pink-footed goose.

Fala Flow SPA (and Ramsar site)

301. Fala Flow SPA is located 16 km south-east of the town of Dalkeith and 2 km south of the village of Fala/Blackshiels. An expanse of blanket bog habitat includes an area of open water, Fala Loch. In winter, the site is a major roost for pink footed geese, with on average, more than 2,400 birds present (SNH, 1990). As the Proposed Development array area could intersect a migratory pathway associated with this SPA, the non-breeding qualifying interest feature of the site is taken forward for determination of LSE: non-breeding pink-footed goose.

Loch of Kinnordy SPA (and Ramsar site)

302. Loch of Kinnordy SPA is a eutrophic loch with associated wet meadows and marshes in Angus, Scotland. The site is of international importance for its wintering goose populations (SNH, 2018f). As the Proposed Development array area could intersect a migratory pathway associated with this SPA, the non-breeding qualifying interest feature of the site are taken forward for determination of LSE: non-breeding greylag goose and pink-footed goose.

Gladhouse Reservoir SPA (and Ramsar site)

303. Gladhouse Reservoir SPA lies in the Moorfoot Hills of the Southern Uplands of Scotland, about 20 km south of Edinburgh. It is a public water-supply reservoir, with limited aquatic and emergent vegetation. The reservoir is the largest freshwater body in the Lothians and is surrounded by both coniferous and mixed woodland and grassland. It has a number of small islands. The site is of international importance for its wintering pink-footed geese, with an average of 10,500 birds (SNH, 2018h). As the Proposed Development array area could intersect a migratory pathway associated with this SPA, the non-breeding qualifying interest feature of the site is taken forward for determination of LSE: non-breeding pink-footed goose.

Loch Leven SPA (and Ramsar site)

304. Loch Leven SPA in central Scotland is the largest natural eutrophic lake in Britain. It is a relatively shallow loch, surrounded by farmland, with a diverse aquatic flora and shoreline vegetation. The SPA supports an internationally important assemblage of wintering waterfowl. The SPA citation quotes a winter peak-mean count (1993/94 – 1997/98) of 34,280 waterfowl (SNH, 2000). As the Proposed Development array area could intersect a migratory pathway associated with this SPA, all migratory non-breeding qualifying interest features are taken forward for determination of LSE: non-breeding cormorant, gadwall, goldeneye, pink-footed goose, pochard, shoveler, teal, tufted duck, whooper swan and waterfowl assemblage.

South Tayside Goose Roosts SPA (and Ramsar site)

305. South Tayside Goose Roosts SPA comprises seven lochs, a number of smaller water bodies and other wetland habitats in Strathearn and Strathallan to the west of Perth. The SPA is of international importance for its wintering waterfowl, with an average of 43,290 birds (1985/86 – 1989/90) (SNH, 2018j). As the Proposed Development array area could intersect a migratory pathway associated with this SPA, the non-breeding qualifying interest features of the site are taken forward for determination of LSE: non-breeding greylag goose, pink-footed goose, wigeon and waterfowl assemblage.

Westwater SPA (and Ramsar site)

306. Westwater SPA is located 320 m above sea level in the Pentland Hills. It is an artificial reservoir forming part of the Lothian water supply. The site is of international importance for its wintering pink-footed geese, with an average of 29,600 birds, which also qualifies the site as an important waterfowl assemblage (SNH, 2018k). As the Proposed Development array area could intersect a migratory pathway associated with this SPA, the non-breeding qualifying interest features of the site are taken forward for determination of LSE: non-breeding pink-footed goose and waterfowl assemblage.

Slamannan Plateau SPA

307. Slamannan Plateau lies just east of Cumbernauld, in the headwaters of the River Avon. It consists of two small lochs and their surrounding peatlands and associated areas of rough and improved grassland. These habitats support roosting and feeding Taiga bean geese during periods in winter, with an average peak (2000/01 – 2004/05) of 221 birds (SNH, 2008). As the Proposed Development array area could intersect a migratory pathway associated with this SPA, the non-breeding qualifying interest feature of the site is taken forward for determination of LSE: non-breeding Taiga bean goose.

5.5.2. PATHWAYS FOR LSE: POTENTIAL IMPACTS ON SEABIRDS AND MIGRATORY WATERBIRD FEATURES

308. A range of potential impacts on seabirds and migratory waterbirds have been identified which may occur during the construction, operation and maintenance, and decommissioning phases of the Proposed Development. These are the impacts which must be taken into account when determining the potential for LSE on the designated sites and seabirds or migratory waterbird features identified in section 4.4.1. 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, particularly the Seagreen 1 offshore wind farm development, as well as published literature. At this stage in the Proposed Development Programme, complete analysis of baseline survey information for the Proposed Development has not yet been carried out, therefore a precautionary approach is taken to the LSE screening.
309. Consideration of the potential impacts identified for seabirds and migratory waterbirds is presented in the following sections to inform the determination of LSE in section 5.5.3. The majority of the European sites screened in include an assemblage qualifying interest feature. This qualifying interest feature is also screened in for LSE for those European sites where there is LSE screened in for one or more of the qualifying interest species features that form part of the assemblage feature.

Construction Phase

Direct Habitat Loss

310. Direct habitat loss may occur during the construction phase of the Proposed Development. However, there is no significant direct loss of habitats used by seabirds or migratory waterbirds in the marine, coastal or inland wetland environments. Indirect loss of habitats used by seabirds or migratory waterbirds is assessed as displacement. Therefore, it is considered that there is no potential for LSE on any ornithological features of European sites as a result of direct habitat loss during the construction phase of the Proposed Development and this impact is therefore screened out of further consideration for all species.

Disturbance and Displacement

311. The presence of vessels and construction works may disturb seabirds from offshore foraging or resting 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 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. Migratory waterbird species would not be significantly affected as they do not forage or rest in the marine environment around the Proposed Development and only move across the area during migration. The proposed offshore export cable corridor landfall is not located near to a European site, so it would not affect any intertidal habitats used by migratory waterbirds associated with a European site.
312. It is extremely unlikely that there will be any significant disturbance to seabirds as a result of the construction of the proposed offshore export cable corridor. Installation is likely to be of short duration, transient and temporary in nature and therefore disturbance will be localised around the source in the very short-term. There is therefore considered to be no potential for LSE on any ornithological features of European sites as a result of disturbance or displacement during the construction phase of the proposed offshore export cable corridor and this impact is therefore screened out of further consideration for all species.

Changes to Prey Availability

313. 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 or productivity in the population in the short-term. This impact would not affect migratory waterbird species as these do not forage within the marine environment. The proposed offshore export cable corridor landfall is not located near to a European site, therefore there will be no impact on intertidal habitats used by migratory waterbirds associated with a European site.

Accidental Pollution

314. There is the potential for pollution to be accidentally released during the construction phase of the Proposed Development from 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. These plans will 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, IMO and MARPOL guidelines for preventing pollution at sea. It is, however, acknowledged that these plans have yet to be drafted and therefore the potential for LSE on ornithological features from accidental pollution cannot be discounted at this stage.

Operation and Maintenance Phase

Direct Habitat Loss

315. Direct habitat loss may occur during the operation and maintenance phase of the Proposed Development. However, there is no significant direct loss of habitats used by seabirds or migratory waterbirds in the marine, coastal or inland wetland environments. Indirect loss of habitats used by birds is assessed as displacement. Therefore, it is considered that there is

no potential for LSE on any ornithological features of European sites as a result of changes to direct habitat loss during the construction phase and this impact is therefore screened out of further consideration for all species.

Disturbance and Displacement

316. The presence of operational wind turbines and associated maintenance activities may disturb seabirds and displace them from foraging/resting areas over the long-term. This may lead to a reduction in foraging opportunities or increased competition and energy expenditure, resulting in decreased survival or productivity in the population. This would apply only to seabirds which use the marine environment within which the Proposed Development array area is located, for foraging and/or resting, although some species are not considered to be sensitive to displacement effects. The species that are not considered to be sensitive to displacement include gannet, fulmar and large gulls. Migratory waterbird species would not be significantly affected as they do not forage or rest in the marine environment around the Proposed Development and only move across the area on migration (assessed as Barrier to Movement). There is no pathway for LSEs as a result of the offshore export cable during operation because it is an immobile structure on the seabed which does not have the potential to interact with seabirds or migratory waterbirds, and maintenance activities involving vessels along the offshore export cable corridor will be minimal. There is therefore considered to be no potential for LSE on any ornithological features of European sites as a result of disturbance or displacement during the operational and maintenance phase of the offshore export cable corridor and this impact is therefore screened out of further consideration for all species.

Collision

317. Collisions of individual seabirds and/or migratory waterbirds with the rotating blades of the wind turbines may result in the death or injury of individuals. Additional mortality may cause a decrease in populations, which may affect seabird species which use the Proposed Development array area for foraging or to commute across, as well as migratory waterbird species as they move across the Proposed Development array area on migration. Given the offshore location of the Proposed Development array area, it is extremely unlikely that any of the wintering migratory waterbird species associated with European sites would make more frequent movements across the Proposed Development array area, for example during movements between foraging or resting sites. The risk of collision for seabirds varies between species; those species that tend to fly at higher altitude, such as kittiwake, gulls, terns and gannet are more at risk, while species that remain at low altitude in flight, such as auks and shearwaters have a very low risk of collision.

Barrier to Movement

318. Large scale offshore wind energy developments may act as a barrier 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 in the context of the substantial distance across which they migrate is extremely unlikely to have any adverse consequences. However, seabird species that commute frequently across the Proposed Development array area could experience frequent increases in energy expenditure to reach favoured foraging areas, which could result in decreased survival or productivity in the population.

Changes to Prey Availability

319. 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 or productivity in the population in the long-term. This would not affect any migratory waterbird species which do not forage within the marine environment. The offshore export cable landfall is not located near to a European designated site, so it would not affect any intertidal habitats used by migratory waterbirds associated with a European site.

Accidental Pollution

320. As discussed above for the construction phase (section 5.5.2), whilst it is anticipated that post-consent plans (i.e. a PEMMP) would reduce the likelihood of an accidental spill occurring during the operation and maintenance phase it is acknowledged that these plans have yet to be drafted. There is therefore considered to be potential for LSE on ornithological features of European sites as a result of accidental pollution.

Decommissioning Phase

321. The impacts during the decommissioning phase are considered to be similar and potentially less than those outlined above in 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 5.15.

5.5.3. DETERMINATION OF LSE FOR SEABIRDS AND MIGRATORY WATERBIRD FEATURES

322. Table 5.15 to Table 5.55 present the results of the assessments to determine whether there will be LSEs as a result of the Proposed Development on the relevant qualifying interest features of the European sites identified for seabirds and migratory waterbirds. Separate LSE screening tables are presented for each one of the 41 European sites identified in section 4.4.
323. 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 LSEs on the identified European site features. Where effects are not applicable to a particular feature they are greyed out.

Table 5.15: LSE Matrix for Marine Ornithological Features of the Outer Firth of Forth and St Andrews Bay Complex pSPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Gannet (breeding)	xa	xa	xb	xb	xb	xc		xd	xe	xe	xf	xf	yg	yg
Guillemot (breeding and non-breeding)	xa	xa	xb	xb		xc		xd	xe	xe	xf	xf	yg	yg
Herring gull (breeding and non-breeding)	xa	xa	xb	xb		xc		xd	xe	xe	xf	xf	yg	yg
Kittiwake (breeding and non-breeding)	xa	xa	xb	xb		xc		xd	xe	xe	xf	xf	yg	yg
Puffin (breeding)	xa	xa	xb	xb		xc		xd	xe	xe	xf	xf	yg	yg
Razorbill (non-breeding)	xa	xa	xb	xb		xc		xd	xe	xe	xf	xf	yg	yg
Seabird assemblage (breeding)	xa	xa	xb	xb		xc		xd	xe	xe	xf	xf	yg	yg
Arctic tern (breeding)	xh	xh	xh	xh		xh		xh	xh	xh	xf	xf	yg	yg
Common tern (breeding)	xh	xh	xh	xh		xh		xh	xh	xh	xf	xf	yg	yg
Black-headed gull (non-breeding)	xj	xj	xj	xj		xj		xj	xj	xj	xf	xf	yg	yg
Common gull (non-breeding)	xj	xj	xj	xj		xj		xj	xj	xj	xf	xf	yg	yg
Little gull (non-breeding)	xj	xj	xj	xj		xj		xj	xj	xj	xf	xf	yg	yg
Common scoter (non-breeding)	xj	xj	xj	xj		xj		xj	xj	xj	xf	xf	yg	yg
Eider (non-breeding)	xj	xj	xj	xj		xj		xj	xj	xj	xf	xf	yg	yg
Goldeneye (non-breeding)	xj	xj	xj	xj		xj		xj	xj	xj	xf	xf	yg	yg
Long-tailed duck (non-breeding)	xj	xj	xj	xj		xj		xj	xj	xj	xf	xf	yg	yg

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Red-breasted merganser (non-breeding)	xj	xj	xj	xj	xj			xj	xj	xj	✓f	✓f	✓g	✓g
Red-throated diver (non- breeding)	xj	xj	xj	xj	xj			xj	xj	xj	✓f	✓f	✓g	✓g
Slavonian grebe (non- breeding)	xj	xj	xj	xj	xj			xj	xj	xj	✓f	✓f	✓g	✓g
Velvet scoter (non- breeding)	xj	xj	xj	xj	xj			xj	xj	xj	✓f	✓f	✓g	✓g
Waterfowl assemblage (non-breeding)	xj	xj	xj	xj	xj			xj	xj	xj	✓f	✓f	✓g	✓g

a: **Direct habitat loss** – there is no significant direct loss of habitats used by seabirds or migratory waterbirds from the pSPA in the marine or coastal environments. Indirect loss of habitats used by birds is assessed as displacement. It can therefore be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.

b: **Disturbance and displacement** – the breeding seabird interest features of the Outer Firth of Forth and St Andrews Bay Complex pSPA comprise the same populations as those SPAs that are designated for breeding seabirds within the Forth and Tay area, but protects instead their foraging habitats. It is considered that, in the absence of any direct effect of the Proposed Development on those foraging habitats, the assessment of the impact of disturbance/displacement on the breeding seabird populations (and the SPAs for which those populations are interest features) will also address any potential effect on the pSPA. These species are within foraging range of one or more SPA breeding colonies around the pSPA and therefore for breeding seabird species that are potentially sensitive to disturbance (guillemot, kittiwake, puffin, razorbill), LSEs on the pSPA cannot be discounted as a result of disturbance/displacement across all phases of the Proposed Development. Gannet and herring gull are not sensitive to disturbance/displacement, therefore LSEs can be discounted for those species.

c: **Collision** – the breeding seabird interest features of the Outer Firth of Forth and St Andrews Bay Complex pSPA comprise the same populations as those SPAs that are designated for breeding seabirds within the Forth and Tay area, but protects instead their foraging habitats. It is considered that, in the absence of any direct effect of the Proposed Development on those foraging habitats, the assessment of the impact of collision mortality on the breeding seabird populations (and the SPAs for which those populations are interest features) will also address any potential effect on the pSPA. These species are within foraging range of one or more SPA breeding colonies around the pSPA and therefore for species that are potentially sensitive to collision (gannet, herring gull, kittiwake), LSEs on the pSPA cannot be discounted as a result of collision during operation of the Proposed Development. Guillemot, puffin and razorbill are not sensitive to collision effects, therefore LSEs can be discounted for those species.

d: **Barrier to movement** – the breeding seabird interest features of the Outer Firth of Forth and St Andrews Bay Complex pSPA comprise the same populations as those SPAs that are designated for breeding seabirds within the Forth and Tay area, but protects instead their foraging habitats. It is considered that, in the absence of any direct effect of

the Proposed Development on those foraging habitats, the assessment of the impact of disturbance/displacement on the breeding seabird populations (and the SPAs for which those populations are interest features) will also address any potential effect on the pSPA. These species are within foraging range of one or more SPA breeding colonies around the pSPA and therefore for breeding seabird species that are potentially sensitive to barrier to movement (guillemot, kittiwake, puffin, razorbill), LSEs on the pSPA cannot be discounted as a result of barrier to movement across all phases of the Proposed Development. Gannet and herring gull are not sensitive to barrier to movement, therefore LSEs can be discounted for those species.

- e: **Changes in prey availability**—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 some seabird species, there is considered to be potential for LSE during the construction phase as a result of noise associated with piling. Given the minimal impacts to fish communities across all other phases of the Proposed Development (as piling is only required during construction), it is concluded that there is no potential for LSE from changes to prey during the operation and maintenance and decommissioning phases.
- f: **Accidental pollution** – whilst best practice approaches are likely to be implemented as part of the Proposed Development to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, it is acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.
- g: **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 these ornithological features of the pSPA as a result of in-combination effects across all phases of the Proposed Development. For breeding seabirds, the assessment of the impact on the breeding seabird populations (and the SPAs for which those populations are interest features) will also address any potential effect on the pSPA.
- h: **All effects (excluding accidental pollution)** – the Proposed Development array area is located beyond the mean-maximum foraging range of the breeding colonies with which these species are associated, but within range of the Proposed Development offshore export cable corridor. However, it is extremely unlikely that there would be any significant disturbance to seabirds as a result of the construction process for the offshore proposed offshore export cable corridor and therefore LSEs on these qualifying interest features can be ruled out.
- i: **All effects (excluding accidental pollution)** – the pSPA is primarily designated to protect the foraging habitat of the qualifying interest features. These non-breeding interest features are likely to occur within the Proposed Development at low densities. Due to their low abundance, likely absence of effects of the Proposed Development offshore export cable construction (other than accidental pollution) and location of the Proposed Development array area out with the boundary of the pSPA, LSEs on these qualifying interest features can be ruled out.

Table 5.16: LSE Matrix for Marine Ornithological Features of the St Abb's Head to Fast Castle SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Guillemot (breeding)	x a	x a	✓ b	✓ b		x c		✓ d	✓ e	x e	✓ f	✓ f	✓ g	✓ g
Razorbill (breeding)	x a	x a	✓ b	✓ b		x c		✓ d	✓ e	x e	✓ f	✓ f	✓ g	✓ g
Herring gull (breeding)	x a	x a	x b	x b		✓ c		x d	✓ e	x e	✓ f	✓ f	✓ g	✓ g
Kittiwake (breeding)	x a	x a	✓ b	✓ b		✓ c		✓ d	✓ e	x e	✓ f	✓ f	✓ g	✓ g
Seabird assemblage (breeding)	x a	x a	✓ b	✓ b		✓ c		✓ d	✓ e	x e	✓ f	✓ f	✓ g	✓ g

- a: **Direct habitat loss** – there is no significant direct loss of habitats used by seabirds in the marine environment. Indirect loss of habitats used by seabirds is assessed as displacement. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.
- b: **Disturbance and displacement** – auks and kittiwake within the Proposed Development array area may be adversely affected as a result of disturbance/displacement. LSEs on guillemot, razorbill and kittiwake as qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out. Herring gull is not sensitive to disturbance/displacement, therefore LSEs can be discounted for that species.
- c: **Collision** – kittiwake and gulls within the Proposed Development array area may be adversely affected as a result of collision. LSEs on kittiwake and herring gull as qualifying interest features of this SPA with regards to kittiwake and herring gull, including the seabird assemblage, cannot be ruled out. Guillemot and razorbill are not sensitive to collision effects, therefore LSEs can be discounted for those species.
- d: **Barrier to movement** – auks and kittiwake within the Proposed Development array area may be adversely affected as a result of barrier to movement. LSEs on guillemot, razorbill and kittiwake as qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out. Herring gull is not sensitive to barrier to movement, therefore LSEs can be discounted for that species.
- e: **Changes in prey availability** – 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 from piling 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 seabird species from this SPA, there is considered to be potential for LSE during the

construction phase. Given the minimal impacts to fish communities across all other phases of the Proposed Development (as piling is only required during construction), it is concluded that there is no potential for LSE from changes to prey during the operation and maintenance and decommissioning phases.

f: **Accidental pollution** – whilst best practice approaches will be implemented as part of the Proposed Development to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, it is acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.

g: **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 these ornithological features of the SPA as a result of in-combination effects across all phases of the Proposed Development.

Table 5.17: LSE Matrix for Marine Ornithological Features of the Northumberland Marine SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Arctic tern (breeding)	x a	x a	✓ b	✓ b		✓ c		✓ d	✓ e	x e	✓ f	✓ f	✓ g	✓ g
Guillemot (breeding)	x a	x a	✓ b	✓ b		x c		✓ d	✓ e	x e	✓ f	✓ f	✓ g	✓ g
Puffin (breeding)	x a	x a	✓ b	✓ b		x c		✓ d	✓ e	x e	✓ f	✓ f	✓ g	✓ g
Seabird assemblage (breeding)	x a	x a	✓ b	✓ b		✓ c		✓ d	✓ e	x e	✓ f	✓ f	✓ g	✓ g

- a: **Direct habitat loss** – there is no significant direct loss of habitats used by seabirds in the marine environment. Indirect loss of habitats used by seabirds is assessed as displacement. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.
- b: **Disturbance and displacement** – auks and terns within the Proposed Development array area may be adversely affected as a result of disturbance/displacement. LSEs on the qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out.
- c: **Collision** – terns within the Proposed Development array area may be adversely affected as a result of collision. LSEs on Arctic tern, as a qualifying interest feature of this SPA, including the seabird assemblage, cannot be ruled out. Guillemot and puffin are not sensitive to collision effects, therefore LSEs can be discounted for those species.
- d: **Barrier to movement** – auks and terns within the Proposed Development array area may be adversely affected as a result of barrier to movement. LSEs on the qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out.
- e: **Changes in prey availability** – 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 from piling 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 seabird species from this SPA, there is considered to be potential for LSE during the construction phase. Given the minimal impacts to fish communities across all other phases of the Proposed Development (as piling is only required during construction), it is concluded that there is no potential for LSE from changes to prey during the operation and maintenance and decommissioning phases.
- f: **Accidental pollution** – whilst best practice approaches will be implemented as part of the Proposed Development to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, it is acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.

g: **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 these ornithological features of the SPA as a result of in-combination effects across all phases of the Proposed Development.

Table 5.18: LSE Matrix for Marine Ornithological Features of the Farne Islands SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Guillemot (breeding)	x a	x a	✓ b	✓ b		x c		✓ d	✓ e	x e	✓ f	✓ f	✓ g	✓ g
Seabird assemblage (breeding)	x a	x a	✓ b	✓ b		x c		✓ d	✓ e	x e	✓ f	✓ f	✓ g	✓ g

a: **Direct habitat loss** – there is no significant direct loss of habitats used by seabirds in the marine environment. Indirect loss of habitats used by seabirds is assessed as displacement. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.

b: **Disturbance and displacement** – guillemots are present within the Proposed Development array area and may be adversely affected as a result of disturbance/displacement. LSEs on the qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out.

c: **Collision** – Guillemot is not at significant risk of collision. It can, therefore, be concluded that there is no potential for LSE on this feature of the site, including the seabird assemblage, as a result of collision.

d: **Barrier to movement** - guillemots are present within the Proposed Development array area and may be adversely affected as a result of barrier to movements. LSEs on the qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out.

e: **Changes in prey availability** – 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 from piling 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 seabird species from this SPA, LSE cannot be ruled out during the construction phase. Given the minimal impacts to fish communities across all other phases of the Proposed Development (as piling is only required during construction), it is concluded that there is no potential for LSE from changes to prey during the operation and maintenance and decommissioning phases.

f: **Accidental pollution** – whilst best practice approaches will be implemented as part of the Proposed Development to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, it is acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.

g: **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 these ornithological features of the SPA as a result of in-combination effects across all phases of the Proposed Development.

Table 5.19: LSE Matrix for Marine Ornithological Features of the Forth Islands SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Gannet (breeding)	x a	x a	x b	x b		✓ c		x d	✓ e	x e	✓ f	✓ f	✓ g	✓ g
Herring gull (breeding)	x a	x a	x b	x b		✓ c		x d	✓ e	x e	✓ f	✓ f	✓ g	✓ g
Lesser black- backed gull (breeding)	x a	x a	x b	x b		✓ c		x d	✓ e	x e	✓ f	✓ f	✓ g	✓ g
Guillemot (breeding)	x a	x a	✓ b	✓ b		x c		✓ d	✓ e	x e	✓ f	✓ f	✓ g	✓ g
Puffin (breeding)	x a	x a	✓ b	✓ b		x c		✓ d	✓ e	x e	✓ f	✓ f	✓ g	✓ g
Razorbill (breeding)	x a	x a	✓ b	✓ b		x c		✓ d	✓ e	x e	✓ f	✓ f	✓ g	✓ g
Kittiwake (breeding)	x a	x a	✓ b	✓ b		✓ c		✓ d	✓ e	x e	✓ f	✓ f	✓ g	✓ g
Seabird assemblage (breeding)	x a	x a	✓ b	✓ b		✓ c		✓ d	✓ e	x e	✓ f	✓ f	✓ g	✓ g

a: **Direct habitat loss** – there is no significant direct loss of habitats used by seabirds in the marine environment. Indirect loss of habitats used by seabirds is assessed as displacement. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.

b: **Disturbance and displacement** – auks and kittiwake within the Proposed Development array area may be adversely affected as a result of disturbance/displacement. LSEs on guillemot, puffin, razorbill and kittiwake as qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out. Gannet, herring gull and lesser black-backed gull are not sensitive to disturbance/displacement, therefore LSEs can be discounted for those species.

c: **Collision** – gannet, kittiwake and gulls within the Proposed Development array area may be adversely affected as a result of collision. LSEs on the qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out. Guillemot, puffin and razorbill are not sensitive to collision effects, therefore LSEs can be discounted for those species.

- d: **Barrier to movement** – auks and kittiwake within the Proposed Development array area may be adversely affected as a result of barrier to movement. LSEs on the qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out. Gannet, herring gull and lesser black-backed gull are not sensitive to barrier to movement, therefore LSEs can be discounted for those species.
- e: **Changes in prey availability** – 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 from piling 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 seabird species from this SPA, there is considered to be potential for LSE during the construction phase. Given the minimal impacts to fish communities across all other phases of the Proposed Development (as piling is only required during construction), it is concluded that there is no potential for LSE from changes to prey during the operation and maintenance and decommissioning phases.
- f: **Accidental pollution** – whilst best practice approaches will be implemented as part of the Proposed Development to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, it is acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.
- g: **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 these ornithological features of the SPA as a result of in-combination effects across all phases of the Proposed Development.

Table 5.20: LSE Matrix for Marine Ornithological Features of the Fowlsheugh SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Fulmar (breeding)	x a		x a	x a		x a		x a	x a	x a	✓ g	✓ g	✓ h	✓ h
Guillemot (breeding)	x b	x b	✓ c	✓ c		x d		✓ e	x f	x f	✓ g	✓ g	✓ h	✓ h
Razorbill (breeding)	x b	x b	✓ c	✓ c		x d		✓ e	x f	x f	✓ g	✓ g	✓ h	✓ h
Kittiwake (breeding)	x b	x b	✓ c	✓ c		✓ d		✓ e	x f	x f	✓ g	✓ g	✓ h	✓ h
Herring gull (breeding)	x b	x b	x c	x c		✓ d		x e	x f	x f	✓ g	✓ g	✓ h	✓ h
Seabird assemblage (breeding)	x b	x b	✓ c	✓ c		✓ d		✓ e	x f	x f	✓ g	✓ g	✓ h	✓ h

a. **All effects (excluding accidental pollution)** - Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward et al. 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement or changes to prey availability. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston et al. 2014a, 2014b), so they are not at significant risk of collision. For those reasons, LSEs can be ruled out for all impacts except accidental pollution.

b. **Direct habitat loss** – there is no significant direct loss of habitats used by seabirds in the marine environment. Indirect loss of habitats used by seabirds is assessed as displacement. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.

c. **Disturbance and displacement** – auks and kittiwake within the Proposed Development array area may be adversely affected as a result of disturbance/displacement. LSEs on guillemot and kittiwake as qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out. Herring gull is not sensitive to disturbance/displacement, therefore LSEs can be discounted for that species.

d. **Collision** – kittiwake and gulls within the Proposed Development array area may be adversely affected as a result of collision. LSEs on the qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out. Guillemot is not sensitive to collision effects, therefore LSEs can be discounted for that species.

- e: **Barrier to movement** – auks and kittiwake within the Proposed Development array area may be adversely affected as a result of barrier to movement. LSEs on guillemot and kittiwake as qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out. Herring gull is not sensitive to barrier to movement, therefore LSEs can be discounted for that species.
- f: **Changes in prey availability** – 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 from piling 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 seabird species from this SPA, there is considered to be potential for LSE during the construction phase. Given the minimal impacts to fish communities across all other phases of the Proposed Development (as piling is only required during construction), it is concluded that there is no potential for LSE from changes to prey during the operation and maintenance and decommissioning phases.
- g: **Accidental pollution** – whilst best practice approaches will be implemented as part of the Proposed Development to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, it is acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.
- 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 these ornithological features of the SPA as a result of in-combination effects across all phases of the Proposed Development.

Table 5.21: LSE Matrix for Marine Ornithological Features of the Buchan Ness to Collieston Coast SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Fulmar (breeding)	x a		x a	x a		x a	x a	x a	x a	x a	✓ g	✓ g	✓ h	✓ h
Guillemot (breeding)	x b	x b	✓ c	✓ c		x d	✓ e		✓ f	x f	✓ g	✓ g	✓ h	✓ h
Kittiwake (breeding)	x b	x b	✓ c	✓ c		✓ d	✓ e		✓ f	x f	✓ g	✓ g	✓ h	✓ h
Seabird assemblage (breeding)	x b	x b	✓ c	✓ c		✓ d	✓ e		✓ f	x f	✓ g	✓ g	✓ h	✓ h

- a. **All effects (excluding accidental pollution)** – Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement or changes to prey availability. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, LSEs can be ruled out for all impacts except accidental pollution.
- b: **Direct habitat loss** – there is no significant direct loss of habitats used by seabirds in the marine environment. Indirect loss of habitats used by seabirds is assessed as displacement. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.
- c: **Disturbance and displacement** – auks and kittiwake within the Proposed Development array area may be adversely affected as a result of disturbance/displacement. LSEs on guillemot and kittiwake as qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out.
- d. **Collision** – kittiwake within the Proposed Development array area may be adversely affected as a result of collision. LSEs on kittiwake as a qualifying interest feature of this SPA, including the seabird assemblage, cannot be ruled out. Guillemot is not sensitive to collision effects, therefore LSEs can be discounted for that species.
- e: **Barrier to movement** – auks and kittiwake within the Proposed Development array area may be adversely affected as a result of barrier to movement. LSEs on guillemot and kittiwake as qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out.
- f: **Changes in prey availability** – 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 from piling 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 seabird species from this SPA, there is considered to be potential for LSE during the

construction phase. Given the minimal impacts to fish communities across all other phases of the Proposed Development (as piling is only required during construction), it is concluded that there is no potential for LSE from changes to prey during the operation and maintenance and decommissioning phases.

g: **Accidental pollution** – whilst best practice approaches will be implemented as part of the Proposed Development to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, it is acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.

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 these ornithological features of the SPA as a result of in-combination effects across all phases of the Proposed Development.

Table 5.22: LSE Matrix for Marine Ornithological Features of the Troup, Pennan and Lion's Heads SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Fulmar (breeding)	x a		x a	x a		x a		x a	x a	x a	✓ g	✓ g	✓ h	✓ h
Guillemot (breeding)	x b	x b	✓ c	✓ c		x d		✓ e	x f	x f	✓ g	✓ g	✓ h	✓ h
Razorbill (breeding)	x b	x b	✓ c	✓ c		x d		✓ e	x f	x f	✓ g	✓ g	✓ h	✓ h
Kittiwake (breeding)	x b	x b	✓ c	✓ c		✓ d		✓ e	x f	x f	✓ g	✓ g	✓ h	✓ h
Seabird assemblage (breeding)	x b	x b	✓ c	✓ c		✓ d		✓ e	x f	x f	✓ g	✓ g	✓ h	✓ h

a. **All effects (excluding accidental pollution)** – Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement or changes to prey availability. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, LSEs can be ruled out for all impacts except accidental pollution.

b: **Direct habitat loss** – there is no significant direct loss of habitats used by seabirds in the marine environment. Indirect loss of habitats used by seabirds is assessed as displacement. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.

c: **Disturbance and displacement** – auks and kittiwake within the Proposed Development array area may be adversely affected as a result of disturbance/displacement. LSEs on guillemot, razorbill and kittiwake as qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out.

d. **Collision** – kittiwake within the Proposed Development array area may be adversely affected as a result of collision. LSEs on kittiwake as a qualifying interest feature of this SPA, including the seabird assemblage, cannot be ruled out. Guillemot and razorbill are not sensitive to collision effects, therefore LSEs can be discounted for those species.

e: **Barrier to movement** – auks and kittiwake within the Proposed Development array area may be adversely affected as a result of barrier to movement. LSEs on guillemot, razorbill and kittiwake as qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out.

- f: **Changes in prey availability** – 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 from piling 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 seabird species from this SPA, there is considered to be potential for LSE during the construction phase. Given the minimal impacts to fish communities across all other phases of the Proposed Development (as piling is only required during construction), it is concluded that there is no potential for LSE from changes to prey during the operation and maintenance and decommissioning phases.
- g: **Accidental pollution** – whilst best practice approaches will be implemented as part of the Proposed Development to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, it is acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.
- 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 these ornithological features of the SPA as a result of in-combination effects across all phases of the Proposed Development.

Table 5.23: LSE Matrix for Marine Ornithological Features of the East Caithness Cliffs SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Fulmar (breeding)	x a		x a	x a		x a		x a	x a	x a	✓ g	✓ g	✓ h	✓ h
Kittiwake (breeding)	x b	x b	✓ c	✓ c		✓ d		✓ e	x f	x f	✓ g	✓ g	✓ h	✓ h
Seabird assemblage (breeding)	x b	x b	✓ c	✓ c		✓ d		✓ e	x f	x f	✓ g	✓ g	✓ h	✓ h

a. **All effects (excluding accidental pollution)** - Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement or changes to prey availability. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, LSEs can be ruled out for all impacts except accidental pollution.

b. **Direct habitat loss** – there is no significant direct loss of habitats used by seabirds in the marine environment. Indirect loss of habitats used by seabirds is assessed as displacement. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.

c. **Disturbance and displacement** – kittiwake within the Proposed Development array area may be adversely affected as a result of disturbance/displacement. LSEs on kittiwake as a qualifying interest feature of this SPA, including the seabird assemblage, cannot be ruled out.

d. **Collision** – kittiwake within the Proposed Development array area may be adversely affected as a result of collision. LSEs on kittiwake as a qualifying interest feature of this SPA, including the seabird assemblage, cannot be ruled out.

e. **Barrier to movement** – kittiwake within the Proposed Development array area may be adversely affected as a result of barrier to movement. LSEs on kittiwake as a qualifying interest feature of this SPA, including the seabird assemblage, cannot be ruled out.

f. **Changes in prey availability** – 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 from piling 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 seabird species from this SPA, LSE cannot be ruled out during the construction phase.

Given the minimal impacts to fish communities across all other phases of the Proposed Development (as piling is only required during construction), it is concluded that there is no potential for LSE from changes to prey during the operation and maintenance and decommissioning phases.

g: **Accidental pollution** – whilst best practice approaches will be implemented as part of the Proposed Development to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, it is acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.

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 these ornithological features of the SPA as a result of in-combination effects across all phases of the Proposed Development.

Table 5.24: LSE Matrix for Marine Ornithological Features of the Flamborough and Filey Coast SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Gannet (breeding)	x a	x a	x b	x b		✓ c		x d	✓ e	x e	✓ f	✓ f	✓ g	✓ g
Kittiwake (breeding)	x a	x a	✓ b	✓ b		✓ c		✓ d	✓ e	x e	✓ f	✓ f	✓ g	✓ g
Seabird assemblage (breeding)	x a	x a	✓ b	✓ b		✓ c		✓ d	✓ e	x e	✓ f	✓ f	✓ g	✓ g

a: **Direct habitat loss** – there is no significant direct loss of habitats used by seabirds in the marine environment. Indirect loss of habitats used by seabirds is assessed as displacement. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.

b: **Disturbance and displacement** – kittiwake within the Proposed Development array area may be adversely affected as a result of disturbance/displacement. LSEs on kittiwake as a qualifying interest feature of this SPA, including the seabird assemblage, cannot be ruled out. Gannet is not sensitive to disturbance/displacement, therefore LSEs can be discounted for that species.

c: **Collision** – gannet and kittiwake within the Proposed Development array area may be adversely affected as a result of collision. LSEs on gannet and kittiwake as qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out.

d: **Barrier to movement** – kittiwake within the Proposed Development array area may be adversely affected as a result of barrier to movement. LSEs on the qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out. Gannet is not sensitive to barrier to movement, therefore LSEs can be discounted for that species.

e: **Changes in prey availability** – 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 from piling 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 seabird species from this SPA, there is considered to be potential for LSE during the construction phase. Given the minimal impacts to fish communities across all other phases of the Proposed Development (as piling is only required during construction), it is concluded that there is no potential for LSE from changes to prey during the operation and maintenance and decommissioning phases.

f: **Accidental pollution** – whilst best practice approaches will be implemented as part of the Proposed Development to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, it is acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.

g: **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 these ornithological features of the SPA as a result of in-combination effects across all phases of the Proposed Development.

Table 5.25: LSE Matrix for Marine Ornithological Features of the North Caithness Cliffs SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Fulmar (breeding)	xa		xa	xa		xa		xa	xa	xa	✓g	✓g	✓h	✓h
Kittiwake (breeding)	xb	xb	✓c	✓c		✓d		✓e	xf	xf	✓g	✓g	✓h	✓h
Puffin (breeding)	xb	xb	✓c	✓c		xd		✓e	xf	xf	✓g	✓g	✓h	✓h
Seabird assemblage (breeding)	xb	xb	✓c	✓c		✓d		✓e	xf	xf	✓g	✓g	✓h	✓h

a. **All effects (excluding accidental pollution)** - Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement or changes to prey availability. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, LSEs can be ruled out for all impacts except accidental pollution.

b. **Direct habitat loss** – there is no significant direct loss of habitats used by seabirds in the marine environment. Indirect loss of habitats used by seabirds is assessed as displacement. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.

c. **Disturbance and displacement** – auks and kittiwake within the Proposed Development array area may be adversely affected as a result of disturbance/displacement. LSEs on puffin and kittiwake as qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out.

d. **Collision** – kittiwake within the Proposed Development array area may be adversely affected as a result of collision. LSEs on kittiwake as a qualifying interest feature of this SPA, including the seabird assemblage, cannot be ruled out. Puffin is not sensitive to collision effects, therefore LSEs can be discounted for that species.

e. **Barrier to movement** – auks and kittiwake within the Proposed Development array area may be adversely affected as a result of barrier to movement. LSEs on puffin and kittiwake as qualifying interest features of this SPA, including the seabird assemblage, cannot be ruled out.

- f: **Changes in prey availability** – 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 from piling 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 seabird species from this SPA, there is considered to be potential for LSE during the construction phase. Given the minimal impacts to fish communities across all other phases of the Proposed Development (as piling is only required during construction), it is concluded that there is no potential for LSE from changes to prey during the operation and maintenance and decommissioning phases.
- g: **Accidental pollution** – whilst best practice approaches will be implemented as part of the Proposed Development to reduce potential impacts associated with accidental pollution events across all phases of the Proposed Development, it is acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.
- 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 these ornithological features of the SPA as a result of in-combination effects across all phases of the Proposed Development.

Table 5.26: LSE Matrix for Marine Ornithological Features of the Copinsay SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Kittiwake (breeding)	x a	x a	x a	x a		x a		x a	x a	x a	x a	x a	x a	x a
Fulmar (breeding)	x b	x b	x b	x b		x b		x b	x b	x b	x b	x b	x b	x b
Seabird assemblage (breeding)	x ab	x ab	x ab	x ab		x ab		x ab	x ab	x ab	x ab	x ab	x ab	x ab

a: Kittiwake is a qualifying interest feature of a number of European sites located in Orkney and Shetland and other remote islands off the north coast of Scotland. These European sites are very distant from the Proposed Development (>275 km) although some are within mean-maximum foraging range (+1 S.D.) with respect to the Proposed Development. There are several other SPAs in closer proximity to the Proposed Development, including the Forth Islands, St Abb's Head to Fastcastle, Fowlsheugh, Buchan Ness to Collieston Coast, East Caithness Cliffs and North Caithness Cliffs. At such distances, the European sites in the far north of Scotland are highly unlikely to contribute any meaningful apportionment to the estimated impact at the Proposed Development and for that reason, LSEs can be ruled out for all impacts.

b: Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement, changes to prey availability or accidental pollution. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, together with the large distance between this SPA and the Proposed Development, LSEs can be ruled out for all impacts.

Table 5.27: LSE Matrix for Marine Ornithological Features of the Hoy SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Kittiwake (breeding)	x a	x a	x a	x a		x a		x a	x a	x a	x a	x a	x a	x a
Fulmar (breeding)	x b	x b	x b	x b		x b		x b	x b	x b	x b	x b	x b	x b
Seabird assemblage (breeding)	x ab	x ab	x ab	x ab		x ab		x ab	x ab	x ab	x ab	x ab	x ab	x ab

a: Kittiwake is a qualifying interest feature of a number of European sites located in Orkney and Shetland and other remote islands off the north coast of Scotland. These European sites are very distant from the Proposed Development (>275 km) although some are within mean-maximum foraging range (+1 S.D.) with respect to the Proposed Development. There are several other SPAs in closer proximity to the Proposed Development, including the Forth Islands, St Abb's Head to Fastcastle, Fowlsheugh, Buchan Ness to Collieston Coast, East Caithness Cliffs and North Caithness Cliffs. At such distances, the European sites in the far north of Scotland are highly unlikely to contribute any meaningful apportionment to the estimated impact at the Proposed Development and for that reason, LSEs can be ruled out for all impacts.

b: Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement, changes to prey availability or accidental pollution. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, together with the large distance between this SPA and the Proposed Development, LSEs can be ruled out for all impacts.

Table 5.28: LSE Matrix for Marine Ornithological Features of the Calf of Eday SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Fulmar (breeding)	x a	x a	x a	x a		x a		x a	x a	x a	x a	x a	x a	x a
Seabird assemblage (breeding)	x a	x a	x a	x a		x a		x a	x a	x a	x a	x a	x a	x a

a: Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement, changes to prey availability or accidental pollution. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, together with the large distance between this SPA and the Proposed Development, LSEs can be ruled out for all impacts.

Table 5.29: LSE Matrix for Marine Ornithological Features of the Rousay SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Fulmar (breeding)	x a	x a	x a	x a		x a		x a	x a	x a	x a	x a	x a	x a
Seabird assemblage (breeding)	x a	x a	x a	x a		x a		x a	x a	x a	x a	x a	x a	x a

a: Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement, changes to prey availability or accidental pollution. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, together with the large distance between this SPA and the Proposed Development, LSEs can be ruled out for all impacts.

unlikely to be adversely affected by disturbance and displacement, barrier to movement, changes to prey availability or accidental pollution. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, together with the large distance between this SPA and the Proposed Development, LSEs can be ruled out for all impacts.

Table 5.30: LSE Matrix for Marine Ornithological Features of the West Westray SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Fulmar (breeding)	xa	xa	xa	xa xa		xa		xa	xa	xa	xa	xa	xa	xa
Seabird assemblage (breeding)	xa	xa	xa	xa xa		xa		xa	xa	xa	xa	xa	xa	xa

a: Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement, changes to prey availability or accidental pollution. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, together with the large distance between this SPA and the Proposed Development, LSEs can be ruled out for all impacts.

Table 5.31: LSE Matrix for Marine Ornithological Features of the Fair Isle SPA

European Site Qualifying Interest Features		Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Fulmar (breeding)		xa	xa	xa	xa	xa	xa	xa	xa	xa	xa	xa	xa	xa	xa
Gannet (breeding)		xb	xb	xb	xb	xb	xb	xb	xb	xb	xb	xb	xb	xb	xb
Seabird assemblage (breeding)		xab	xab	xab	xab	xab	xab	xab	xab	xab	xab	xab	xab	xab	xab

a: Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement, changes to prey availability and accidental pollution. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, together with the large distance between this SPA and the Proposed Development, LSEs can be ruled out for all impacts.

b: Gannet is a qualifying interest feature of a number of European sites located in Orkney and Shetland and other remote islands off the north coast of Scotland. These European sites are very distant from the Proposed Development (>275 km) although are within mean-maximum foraging range (+1 S.D.) of gannet with respect to the Proposed Development. Bass Rock in the Forth Islands SPA hosts over 150,000 individuals and is located approximately 70 km away from the Proposed Development array area. At such distances, the European sites in the far north of Scotland are highly unlikely to contribute any meaningful apportionment to the estimated impact at the Proposed Development and for that reason, LSEs can be ruled out for all impacts.

Table 5.32: LSE Matrix for Marine Ornithological Features of the Sule Skerry and Sule Stack SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Gannet (breeding)	xa	xa	xa	xa	xa	xa		xa	xa	xa	xa	xa	xa	xa
Seabird assemblage (breeding)	xa	xa	xa	xa	xa	xa		xa	xa	xa	xa	xa	xa	xa

a: Gannet is a qualifying interest feature of a number of European sites located in Orkney and Shetland and other remote islands off the north coast of Scotland. These European sites are very distant from the Proposed Development (>275 km) although are within mean-maximum foraging range (+1 S.D.) of gannet with respect to the Proposed Development. Bass Rock in the Forth Islands SPA hosts over 150,000 individuals and is located approximately 70 km away from the Proposed Development array area. At such distances, the European sites in the far north of Scotland are highly unlikely to contribute any meaningful apportionment to the estimated impact at the Proposed Development and for that reason, LSEs can be ruled out for all impacts.

Table 5.33: LSE Matrix for Marine Ornithological Features of the Cape Wrath SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Fulmar (breeding)	xa	xa	xa	xa	xa	xa		xa	xa	xa	xa	xa	xa	xa
Seabird assemblage (breeding)	xa	xa	xa	xa	xa	xa		xa	xa	xa	xa	xa	xa	xa

a: Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement, changes to prey availability or accidental pollution. Fulmar typically fly at low altitude

above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, together with the large distance between this SPA and the Proposed Development, LSEs can be ruled out for all impacts.

Table 5.34: LSE Matrix for Marine Ornithological Features of the Sumburgh Head SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Fulmar (breeding)	xa	xa	xa	xa	xa	xa		xa	xa	xa	xa	xa	xa	xa
Seabird assemblage (breeding)	xa	xa	xa	xa	xa	xa		xa	xa	xa	xa	xa	xa	xa

a: Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement, changes to prey availability or accidental pollution. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, together with the large distance between this SPA and the Proposed Development, LSEs can be ruled out for all impacts.

Table 5.35: LSE Matrix for Marine Ornithological Features of the Foula SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Fulmar (breeding)	xa	xa	xa	xa	xa	xa		xa	xa	xa	xa	xa	xa	xa
Seabird assemblage (breeding)	xa	xa	xa	xa	xa	xa		xa	xa	xa	xa	xa	xa	xa

a: Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement, changes to prey availability or accidental pollution. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, together with the large distance between this SPA and the Proposed Development, LSEs can be ruled out for all impacts.

Table 5.36: LSE Matrix for Marine Ornithological Features of the Handa SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Fulmar (breeding)	xa	xa	xa	xa	xa	xa		xa	xa	xa	xa	xa	xa	xa
Seabird assemblage (breeding)	xa	xa	xa	xa	xa	xa		xa	xa	xa	xa	xa	xa	xa

a: Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore

ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement, changes to prey availability or accidental pollution. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, together with the large distance between this SPA and the Proposed Development, LSEs can be ruled out for all impacts.

Table 5.37: LSE Matrix for Marine Ornithological Features of the Noss SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Fulmar (breeding)	x a	x a	x a	x a		x a		x a	x a	x a	x a	x a	x a	x a
Gannet (breeding)	x b	x b	x b	x b		x b		x b	x b	x b	x b	x b	x b	x b
Seabird assemblage (breeding)	x ab	x ab	x ab	x ab		x ab		x ab	x ab	x ab	x ab	x ab	x ab	x ab

a: Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement, changes to prey availability or accidental pollution. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, together with the large distance between this SPA and the Proposed Development, LSEs can be ruled out for all impacts.

b: Gannet is a qualifying interest feature of a number of European sites located in Orkney and Shetland and other remote islands off the north coast of Scotland. These European sites are very distant from the Proposed Development (>275 km) although are within mean-maximum foraging range (+1 S.D.) of gannet with respect to the Proposed Development. Bass Rock in the Forth Islands SPA hosts over 150,000 individuals and is located approximately 70 km away from the Proposed Development array area. At such distances, the European sites in the far north of Scotland are highly unlikely to contribute any meaningful apportionment to the estimated impact at the Proposed Development and for that reason, LSEs can be ruled out for all impacts.

Table 5.38: LSE Matrix for Marine Ornithological Features of the North Rona and Sula Sgeir SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Fulmar (breeding)	xa	xa	xa	xa	xa	xa	xa	xa	xa	xa	xa	xa	xa	xa
Gannet (breeding)	xb	xb	xb	xb	xb	xb	xb	xb	xb	xb	xb	xb	xb	xb
Seabird assemblage (breeding)	xab	xab	xab	xab	xab	xab	xab	xab	xab	xab	xab	xab	xab	xab

a: Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement, changes to prey availability or accidental pollution. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, together with the large distance between this SPA and the Proposed Development, LSEs can be ruled out for all impacts.

b: Gannet is a qualifying interest feature of a number of European sites located in Orkney and Shetland and other remote islands off the north coast of Scotland. These European sites are very distant from the Proposed Development (>275 km) although are within mean-maximum foraging range (+1 S.D.) of gannet with respect to the Proposed Development. Bass Rock in the Forth Islands SPA hosts over 150,000 individuals and is located approximately 70 km away from the Proposed Development array area. At such distances, the European sites in the far north of Scotland are highly unlikely to contribute any meaningful apportionment to the estimated impact at the Proposed Development and for that reason, LSEs can be ruled out for all impacts.

Table 5.39: LSE Matrix for Marine Ornithological Features of the Fetlar SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Fulmar (breeding)	x a	x a	x a	x a		x a		x a	x a	x a	x a	x a	x a	x a
Seabird assemblage (breeding)	x a	x a	x a	x a		x a		x a	x a	x a	x a	x a	x a	x a

a: Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement, changes to prey availability or accidental pollution. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, together with the large distance between this SPA and the Proposed Development, LSEs can be ruled out for all impacts.

Table 5.40: LSE Matrix for Marine Ornithological Features of the Shiant Isles SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Fulmar (breeding)	x a	x a	x a	x a		x a		x a	x a	x a	x a	x a	x a	x a
Seabird assemblage (breeding)	x a	x a	x a	x a		x a		x a	x a	x a	x a	x a	x a	x a

a: Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement, changes to prey availability or accidental pollution. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, together with the large distance between this SPA and the Proposed Development, LSEs can be ruled out for all impacts.

unlikely to be adversely affected by disturbance and displacement, barrier to movement, changes to prey availability or accidental pollution. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, together with the large distance between this SPA and the Proposed Development, LSEs can be ruled out for all impacts.

Table 5.41: LSE Matrix for Marine Ornithological Features of the Hermaness, Saxa Vord and Valla Field SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Fulmar (breeding)	x a	x a	x a	x a		x a		x a	x a	x a	x a	x a	x a	x a
Gannet (breeding)	x b	x b	x b	x b		x b		x b	x b	x b	x b	x b	x b	x b
Seabird assemblage (breeding)	x ab	x ab	x ab	x ab		x ab		x ab	x ab	x ab	x ab	x ab	x ab	x ab

a: Fulmar is a qualifying interest feature of many European sites within mean-maximum foraging range (+1 S.D.) of the Proposed Development. Provisional analyses of the aerial survey data collected between March to September 2019 indicates that the species is present at low densities (monthly range 0.04 to 0.17 birds/km²) within the offshore ornithology study area. However, the foraging range of fulmar is very large (mean-maximum range 542.3 ± 657.9 km, Woodward *et al.* 2019), therefore the species is extremely unlikely to be adversely affected by disturbance and displacement, barrier to movement, changes to prey availability or accidental pollution. Fulmar typically fly at low altitude above sea level with approximately 99% of flights occurring below 20 m above sea level (Johnston *et al.* 2014a, 2014b), so they are not at significant risk of collision. For those reasons, together with the large distance between this SPA and the Proposed Development, LSEs can be ruled out for all impacts.

b: Gannet is a qualifying interest feature of a number of European sites located in Orkney and Shetland and other remote islands off the north coast of Scotland. These European sites are very distant from the Proposed Development (>275 km) although are within mean-maximum foraging range (+1 S.D.) of gannet with respect to the Proposed Development. Bass Rock in the Forth Islands SPA hosts over 150,000 individuals and is located approximately 70 km away from the Proposed Development array area. At such distances, the European sites in the far north of Scotland are highly unlikely to contribute any meaningful apportionment to the estimated impact at the Proposed Development and for that reason, LSEs can be ruled out for all impacts.

Table 5.42: LSE Matrix for Marine Ornithological Features of the Firth of Forth SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Bar-tailed godwit (non-breeding)	xa		xb	xb	✓c			✓d	xe	xe	✓f	✓f	yg	yg
Common Scoter (non-breeding)	xa		xb	xb	✓c			✓d	xe	xe	✓f	✓f	yg	yg
Cormorant (non- breeding)	xa		xb	xb	✓c			✓d	xe	xe	✓f	✓f	yg	yg
Curlew (non- breeding)	xa		xb	xb	✓c			✓d	xe	xe	✓f	✓f	yg	yg
Dunlin (non- breeding)	xa		xb	xb	✓c			✓d	xe	xe	✓f	✓f	yg	yg
Eider (non- breeding)	xa		xb	xb	✓c			✓d	xe	xe	✓f	✓f	yg	yg
Golden plover (non-breeding)	xa		xb	xb	✓c			✓d	xe	xe	✓f	✓f	yg	yg
Goldeneye (non- breeding)	xa		xb	xb	✓c			✓d	xe	xe	✓f	✓f	yg	yg
Great crested grebe (non- breeding)	xa		xb	xb	✓c			✓d	xe	xe	✓f	✓f	yg	yg
Grey plover (non- breeding)	xa		xb	xb	✓c			✓d	xe	xe	✓f	✓f	yg	yg
Knot (non- breeding)	xa		xb	xb	✓c			✓d	xe	xe	✓f	✓f	yg	yg
Lapwing (non- breeding)	xa		xb	xb	✓c			✓d	xe	xe	✓f	✓f	yg	yg
Long-tailed duck (non-breeding)	xa		xb	xb	✓c			✓d	xe	xe	✓f	✓f	yg	yg
Mallard (non- breeding)	xa		xb	xb	✓c			✓d	xe	xe	✓f	✓f	yg	yg

European Site Qualifying Interest Features															
Direct Habitat Loss				Disturbance/Displacement		Collision	Barrier to Movement		Changes in Prey Availability		Accidental Pollution		In-combination Effects		
Oystercatcher (non-breeding)	xa		xb	xb	xb	✓c		✓d	xe	xe	✓f	✓f	xg	✓g	xg
Pink-footed goose (non-breeding)	xa		xb	xb	xb	✓c		✓d	xe	xe	✓f	✓f	xg	✓g	xg
Red-breasted merganser (non-breeding)	xa		xb	xb	xb	✓c		✓d	xe	xe	✓f	✓f	xg	✓g	xg
Red-throated diver (non-breeding)	xa		xb	xb	xb	✓c		✓d	xe	xe	✓f	✓f	xg	✓g	xg
Redshank (non-breeding)	xa		xb	xb	xb	✓c		✓d	xe	xe	✓f	✓f	xg	✓g	xg
Ringed plover (non-breeding)	xa		xb	xb	xb	✓c		✓d	xe	xe	✓f	✓f	xg	✓g	xg
Sandwich tern (passage)	xa		xb	xb	xb	✓c		✓d	xe	xe	✓f	✓f	xg	✓g	xg
Scaup (non-breeding)	xa		xb	xb	xb	✓c		✓d	xe	xe	✓f	✓f	xg	✓g	xg
Shelduck (non-breeding)	xa		xb	xb	xb	✓c		✓d	xe	xe	✓f	✓f	xg	✓g	xg
Slavonian grebe (non-breeding)	xa		xb	xb	xb	✓c		✓d	xe	xe	✓f	✓f	xg	✓g	xg
Turnstone (non-breeding)	xa		xb	xb	xb	✓c		✓d	xe	xe	✓f	✓f	xg	✓g	xg
Velvet scoter (non-breeding)	xa		xb	xb	xb	✓c		✓d	xe	xe	✓f	✓f	xg	✓g	xg
Waterfowl assemblage (non-breeding)	xa		xb	xb	xb	✓c		✓d	xe	xe	✓f	✓f	xg	✓g	xg
Wigeon (non-breeding)	xa		xb	xb	xb	✓c		✓d	xe	xe	✓f	✓f	xg	✓g	xg

- a: **Direct habitat loss** – there is no direct loss of habitats used by migratory waterbirds in the marine environment. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.
- b: **Disturbance and displacement** – these qualifying interest species of migratory waterbird may pass through the Proposed Development array area during migration. Waders will not use the marine habitats and the qualifying seaduck and diver species do not tend to use the marine habitats that far offshore. Some species of seaduck and diver may be present at very low density. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the SPA as a result of disturbance/displacement.
- c: **Collision** – these qualifying interest species of migratory waterbird may pass through the Proposed Development array area during migration and may be adversely affected as a result of collision. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.
- d: **Barrier to movement** – these qualifying interest species of migratory waterbird may pass through the Proposed Development array area during migration and may be adversely affected as a result of barrier to movement. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.
- e: **Changes in prey availability** – these qualifying interest species of migratory waterbird may pass through the Proposed Development array area during migration. Waders will not use the marine habitats and the qualifying seaduck and diver species do not tend to use the marine habitats that far offshore. Some species of seaduck and diver may be present at very low density. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of changes in prey availability.
- f: **Accidental pollution** – whilst a number of best practice approaches will be implemented as part of the Proposed Development, it is acknowledged that these plans have yet to be drafted and therefore LSE cannot be ruled out at this stage.
- g: **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 these ornithological features of the SPA as a result of in-combination effects during the operational phase of the Proposed Development.

Table 5.43: LSE Matrix for Marine Ornithological Features of the Montrose Basin SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Dunlin (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g
Eider (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g
Greylag goose (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g
Knot (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g
Oystercatcher (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g
Pink-footed goose (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g
Redshank (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g
Shelduck (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g
Waterfowl assemblage (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g
Wigeon (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g

a: **Direct habitat loss** – there is no direct loss of habitats used by migratory waterbirds in the marine environment. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.

b: **Disturbance and displacement** – these qualifying interest species of migratory waterbird may pass through the Proposed Development array area during migration. Waders will not use the marine habitats and the qualifying seaduck and diver species do not tend to use the marine habitats that far offshore. Some species of seaduck and diver may be present at very low density. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the SPA as a result of disturbance/displacement.

- c: **Collision** – these qualifying interest species of migratory waterbird may pass through the Proposed Development array area during migration and may be adversely affected as a result of collision. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.
- d: **Barrier to movement** – these qualifying interest species of migratory waterbird may pass through the Proposed Development array area during migration and may be adversely affected as a result of barrier to movement. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.
- e: **Changes in prey availability** – these qualifying interest species of migratory waterbird may pass through the Proposed Development array area during migration. Waders will not use the marine habitats and the qualifying seaduck and diver species do not tend to use the marine habitats that far offshore. Some species of seaduck and diver may be present at very low density. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of changes in prey availability.
- f: **Accidental pollution** – this SPA is located 57 km from the Proposed Development and so any accidental spill would be highly unlikely to significantly impact key habitats for qualifying features or the features directly. It can therefore be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of accidental pollution.
- g: **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 these ornithological features of the SPA as a result of in-combination effects during the operational phase of the Proposed Development.

Table 5.44: LSE Matrix for Marine Ornithological Features of the Firth of Tay and Eden Estuary SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Bar-tailed godwit (non-breeding)	xa	xa	xb	xb xb		✓c		✓d	xe	xe	xf	xf	xf	✓g xg
Common Scoter (non-breeding)	xa	xa	xb	xb xb		✓c		✓d	xe	xe	xf	xf	xf	✓g xg
Cormorant (non- breeding)	xa	xa	xb	xb xb		✓c		✓d	xe	xe	xf	xf	xf	✓g xg
Dunlin (non- breeding)	xa	xa	xb	xb xb		✓c		✓d	xe	xe	xf	xf	xf	✓g xg
Eider (non- breeding)	xa	xa	xb	xb xb		✓c		✓d	xe	xe	xf	xf	xf	✓g xg
Goldeneye (non- breeding)	xa	xa	xb	xb xb		✓c		✓d	xe	xe	xf	xf	xf	✓g xg
Goosander (non- breeding)	xa	xa	xb	xb xb		✓c		✓d	xe	xe	xf	xf	xf	✓g xg
Grey plover (non- breeding)	xa	xa	xb	xb xb		✓c		✓d	xe	xe	xf	xf	xf	✓g xg
Greylag goose (non-breeding)	xa	xa	xb	xb xb		✓c		✓d	xe	xe	xf	xf	xf	✓g xg
Icelandic black- tailed godwit (non- breeding)	xa	xa	xb	xb xb		✓c		✓d	xe	xe	xf	xf	xf	✓g xg
Long-tailed duck (non-breeding)	xa	xa	xb	xb xb		✓c		✓d	xe	xe	xf	xf	xf	✓g xg
Oystercatcher (non-breeding)	xa	xa	xb	xb xb		✓c		✓d	xe	xe	xf	xf	xf	✓g xg
Pink-footed goose (non-breeding)	xa	xa	xb	xb xb		✓c		✓d	xe	xe	xf	xf	xf	✓g xg
Red-breasted merganser (non- breeding)	xa	xa	xb	xb xb		✓c		✓d	xe	xe	xf	xf	xf	✓g xg

European Site Qualifying Interest Features	Direct Habitat Loss	Disturbance/ Displacement	Collision	Barrier to Movement	Changes in Prey Availability	Accidental Pollution	In-combination Effects
Redshank (non-breeding)	x a	x b	✓ c	✓ d	x e	x f	✓ g
Sanderling (non-breeding)	x a	x b	✓ c	✓ d	x e	x f	✓ g
Shelduck (non-breeding)	x a	x b	✓ c	✓ d	x e	x f	✓ g
Velvet scoter (non-breeding)	x a	x b	✓ c	✓ d	x e	x f	✓ g
Waterfowl assemblage (non-breeding)	x a	x b	✓ c	✓ d	x e	x f	✓ g

a: **Direct habitat loss** – there is no direct loss of habitats used by migratory waterbirds in the marine environment. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.

b: **Disturbance and displacement** – these qualifying interest species of migratory waterbird may pass through the Proposed Development array area during migration. Waders will not use the marine habitats and the qualifying seaduck and diver species do not tend to use the marine habitats that far offshore. Some species of seaduck and diver may be present at very low density. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the SPA as a result of disturbance/displacement.

c: **Collision** – these qualifying interest species of migratory waterbird may pass through the Proposed Development array area during migration and may be adversely affected as a result of collision. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.

d: **Barrier to movement** – these qualifying interest species of migratory waterbird may pass through the Proposed Development array area during migration and may be adversely affected as a result of barrier to movement. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.

e: **Changes in prey availability** – these qualifying interest species of migratory waterbird may pass through the Proposed Development array area during migration. Waders will not use the marine habitats and the qualifying seaduck and diver species do not tend to use the marine habitats that far offshore. Some species of seaduck and diver may be present at very low density. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of changes in prey availability.

f: **Accidental pollution** – this SPA is located 62 km from the Proposed Development and so any accidental spill would be highly unlikely to significantly impact key habitats for qualifying features or the features directly. It can therefore be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of accidental pollution.

g: **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 these ornithological features of the SPA as a result of in-combination effects during the operational phase of the Proposed Development.

Table 5.45: LSE Matrix for Marine Ornithological Features of the Ythan Estuary, Sands of Forvie and Meikle Loch SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Eider (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g
Lapwing (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g
Pink-footed goose (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g
Redshank (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g
Waterfowl assemblage (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g

a: **Direct habitat loss** – there is no direct loss of habitats used by migratory waterbirds in the marine environment. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.

b: **Disturbance and displacement** – these qualifying interest species of migratory waterbird may pass through the Proposed Development array area during migration. Waders will not use the marine habitats and the qualifying seaduck and diver species do not tend to use the marine habitats that far offshore. Some species of seaduck and diver may be present at very low density. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the SPA as a result of disturbance/displacement.

c: **Collision** – these qualifying interest species of migratory waterbird may pass through the Proposed Development array area during migration and may be adversely affected as a result of collision. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.

d: **Barrier to movement** – these qualifying interest species of migratory waterbird may pass through the Proposed Development array area during migration and may be adversely affected as a result of barrier to movement. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.

e: **Changes in prey availability** – these qualifying interest species of migratory waterbird may pass through the Proposed Development array area during migration. Waders will not use the marine habitats and the qualifying seaduck and diver species do not tend to use the marine habitats that far offshore. Some species of seaduck and diver may be present at very low density. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of changes in prey availability.

f: **Accidental pollution** – this SPA is located 95 km from the Proposed Development and so any accidental spill would be highly unlikely to significantly impact key habitats for qualifying features or the features directly. It can therefore be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of accidental pollution.

g: **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 these ornithological features of the SPA as a result of in-combination effects during the operational phase of the Proposed Development.

Table 5.46: LSE Matrix for Marine Ornithological Features of the Greenlaw Moor SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Pink-footed goose (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g

a: **Direct habitat loss** – there is no direct loss of habitats used by migratory geese in the marine environment. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.

b: **Disturbance and displacement** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the SPA as a result of disturbance/ displacement.

c: **Collision** – geese may pass through the Proposed Development array area during migration and may be adversely affected as a result of collision. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.

d: **Barrier to movement** – geese may pass through the Proposed Development array area during migration and may be adversely affected as a result of barrier to movement. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.

e: **Changes in prey availability** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of changes in prey availability.

f: **Accidental pollution** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can therefore be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of accidental pollution.

g: **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 these ornithological features of the SPA as a result of in-combination effects during the operational phase of the Proposed Development.

Table 5.47: LSE Matrix for Marine Ornithological Features of the Cameron Reservoir SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Pink-footed goose (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g

- a: **Direct habitat loss** – there is no direct loss of habitats used by migratory geese in the marine environment. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.
- b: **Disturbance and displacement** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the SPA as a result of disturbance/ displacement.
- c: **Collision** – geese may pass through the Proposed Development array area during migration and may be adversely affected as a result of collision. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.
- d: **Barrier to movement** – geese may pass through the Proposed Development array area during migration and may be adversely affected as a result of barrier to movement. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.
- e: **Changes in prey availability** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of changes in prey availability.
- f: **Accidental pollution** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can therefore be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of accidental pollution.
- g: **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 these ornithological features of the SPA as a result of in-combination effects during the operational phase of the Proposed Development.

Table 5.48: LSE Matrix for Marine Ornithological Features of the Din Moss – Hoselaw Loch SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Greylag goose (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g
Pink-footed goose (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g

a: **Direct habitat loss** – there is no direct loss of habitats used by migratory geese in the marine environment. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.

b: **Disturbance and displacement** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the SPA as a result of disturbance/ displacement.

c: **Collision** – geese may pass through the Proposed Development array area during migration and may be adversely affected as a result of collision. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.

d: **Barrier to movement** – geese may pass through the Proposed Development array area during migration and may be adversely affected as a result of barrier to movement. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.

e: **Changes in prey availability** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of changes in prey availability.

f: **Accidental pollution** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can therefore be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of accidental pollution.

g: **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 these ornithological features of the SPA as a result of in-combination effects during the operational phase of the Proposed Development.

Table 5.49: LSE Matrix for Marine Ornithological Features of the Fala Flow SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Pink-footed goose (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g

a: **Direct habitat loss** – there is no direct loss of habitats used by migratory geese in the marine environment. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.

b: **Disturbance and displacement** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the SPA as a result of disturbance/ displacement.

c: **Collision** – geese may pass through the Proposed Development array area during migration and may be adversely affected as a result of collision. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.

d: **Barrier to movement** – geese may pass through the Proposed Development array area during migration and may be adversely affected as a result of barrier to movement. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.

e: **Changes in prey availability** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of changes in prey availability.

f: **Accidental pollution** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can therefore be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of accidental pollution.

g: **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 these ornithological features of the SPA as a result of in-combination effects during the operational phase of the Proposed Development.

Table 5.50: LSE Matrix for Marine Ornithological Features of the Loch of Kinnordy SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Greylag goose (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g
Pink-footed goose (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g

a: **Direct habitat loss** – there is no direct loss of habitats used by migratory geese in the marine environment. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.

b: **Disturbance and displacement** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the SPA as a result of disturbance/ displacement.

c: **Collision** – geese may pass through the Proposed Development array area during migration and may be adversely affected as a result of collision. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.

d: **Barrier to movement** – geese may pass through the Proposed Development array area during migration and may be adversely affected as a result of barrier to movement. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.

e: **Changes in prey availability** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of changes in prey availability.

f: **Accidental pollution** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can therefore be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of accidental pollution.

g: **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 these ornithological features of the SPA as a result of in-combination effects during the operational phase of the Proposed Development.

Table 5.51: LSE Matrix for Marine Ornithological Features of the Gladhouse Reservoir SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Pink-footed goose (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g

- a: **Direct habitat loss** – there is no direct loss of habitats used by migratory geese in the marine environment. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.
- b: **Disturbance and displacement** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the SPA as a result of disturbance/ displacement.
- c: **Collision** – geese may pass through the Proposed Development array area during migration and may be adversely affected as a result of collision. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.
- d: **Barrier to movement** – geese may pass through the Proposed Development array area during migration and may be adversely affected as a result of barrier to movement. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.
- e: **Changes in prey availability** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of changes in prey availability.
- f: **Accidental pollution** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can therefore be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of accidental pollution.
- g: **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 these ornithological features of the SPA as a result of in-combination effects during the operational phase of the Proposed Development.

Table 5.52: LSE Matrix for Marine Ornithological Features of the Loch Leven SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Cormorant (non-breeding)	xa	xa	xb	xb	xb	xb	xb	xb	xe	xe	xf	xf	xf	xf
Gadwall (non-breeding)	xa	xa	xb	xb	xb	xb	xb	xb	xe	xe	xf	xf	xf	xf
Goldeneye (non-breeding)	xa	xa	xb	xb	xb	xb	xb	xb	xe	xe	xf	xf	xf	xf
Pink-footed goose (non-breeding)	xa	xa	xb	xb	xb	xb	xb	xb	xe	xe	xf	xf	xf	xf
Pochard (non-breeding)	xa	xa	xb	xb	xb	xb	xb	xb	xe	xe	xf	xf	xf	xf
Shoveler (non-breeding)	xa	xa	xb	xb	xb	xb	xb	xb	xe	xe	xf	xf	xf	xf
Teal (non-breeding)	xa	xa	xb	xb	xb	xb	xb	xb	xe	xe	xf	xf	xf	xf
Tufted duck (non-breeding)	xa	xa	xb	xb	xb	xb	xb	xb	xe	xe	xf	xf	xf	xf
Waterfowl assemblage (non-breeding)	xa	xa	xb	xb	xb	xb	xb	xb	xe	xe	xf	xf	xf	xf
Whooper swan (non-breeding)	xa	xa	xb	xb	xb	xb	xb	xb	xe	xe	xf	xf	xf	xf

a: **Direct habitat loss** – there is no direct loss of habitats used by these species of migratory wildfowl in the marine environment. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.

b: **Disturbance and displacement** – migratory wildfowl may pass through the Proposed Development array area during migration but will not use the marine habitats, with the possible exception of cormorant, which is present at very low density within the Proposed Development array area. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the SPA as a result of disturbance/ displacement.

c: **Collision** – migratory wildfowl may pass through the Proposed Development array area during migration and may be adversely affected as a result of collision. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.

- d: **Barrier to movement** – migratory wildfowl may pass through the Proposed Development array area during migration and may be adversely affected as a result of barrier to movement. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.
- e: **Changes in prey availability** – migratory wildfowl may pass through the Proposed Development array area during migration but will not use the marine habitats, with the possible exception of cormorant, which is present at very low density within the Proposed Development array area. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of changes in prey availability.
- f: **Accidental pollution** – this SPA is located 102 km from the Proposed Development. Qualifying features may pass through the Proposed Development array area during migration but will not use the marine habitats. It can therefore be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of accidental pollution.
- g: **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 these ornithological features of the SPA as a result of in-combination effects during the operational phase of the Proposed Development.

Table 5.53: LSE Matrix for Marine Ornithological Features of the South Tayside Goose Roosts SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Greylag goose (non-breeding)	x/a	x/a	x/b	x/b		✓/c		✓/d	x/e	x/e	x/f	x/f	x/g	✓/g
Pink-footed goose (non-breeding)	x/a	x/a	x/b	x/b		✓/c		✓/d	x/e	x/e	x/f	x/f	x/g	✓/g
Waterfowl assemblage (non-breeding)	x/a	x/a	x/b	x/b		✓/c		✓/d	x/e	x/e	x/f	x/f	x/g	✓/g

- a: **Direct habitat loss** – there is no direct loss of habitats used by migratory geese in the marine environment. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.
- b: **Disturbance and displacement** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the SPA as a result of disturbance/ displacement.
- c: **Collision** – geese may pass through the Proposed Development array area during migration and may be adversely affected as a result of collision. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.
- d: **Barrier to movement** – geese may pass through the Proposed Development array area during migration and may be adversely affected as a result of barrier to movement. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.
- e: **Changes in prey availability** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of changes in prey availability.
- f: **Accidental pollution** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can therefore be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of accidental pollution.
- g: **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 these ornithological features of the SPA as a result of in-combination effects during the operational phase of the Proposed Development.

Table 5.54: LSE Matrix for Marine Ornithological Features of the Westwater SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Pink-footed goose (non-breeding)	x a	x a	x b	x b	✓ c	✓ c	✓ d	✓ d	x e	x e	x f	x f	x g	x g
Waterfowl assemblage (non- breeding)	x a	x a	x b	x b	✓ c	✓ c	✓ d	✓ d	x e	x e	x f	x f	x g	x g

a: **Direct habitat loss** – there is no direct loss of habitats used by migratory geese in the marine environment. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.

b: **Disturbance and displacement** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the SPA as a result of disturbance/ displacement.

c: **Collision** – geese may pass through the Proposed Development array area during migration and may be adversely affected as a result of collision. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.

d: **Barrier to movement** – geese may pass through the Proposed Development array area during migration and may be adversely affected as a result of barrier to movement. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.

e: **Changes in prey availability** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of changes in prey availability.

f: **Accidental pollution** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can therefore be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of accidental pollution.

g: **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 these ornithological features of the SPA as a result of in-combination effects during the operational phase of the Proposed Development.

Table 5.55: LSE Matrix for Marine Ornithological Features of the Slamannan Plateau SPA

European Site Qualifying Interest Features	Direct Habitat Loss		Disturbance/ Displacement		Collision		Barrier to Movement		Changes in Prey Availability		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
Taiga bean goose (non-breeding)	x a	x a	x b	x b		✓ c		✓ d	x e	x e	x f	x f	x g	✓ g

- a: **Direct habitat loss** – there is no direct loss of habitats used by migratory geese in the marine environment. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of direct habitat loss.
- b: **Disturbance and displacement** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the SPA as a result of disturbance/ displacement.
- c: **Collision** – geese may pass through the Proposed Development array area during migration and may be adversely affected as a result of collision. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.
- d: **Barrier to movement** – geese may pass through the Proposed Development array area during migration and may be adversely affected as a result of barrier to movement. LSEs on the qualifying interest features of this SPA cannot be ruled out at this stage.
- e: **Changes in prey availability** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can, therefore, be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of changes in prey availability.
- f: **Accidental pollution** – geese may pass through the Proposed Development array area during migration but will not use the marine habitats. It can therefore be concluded that there is no potential for LSE on the qualifying interest features of the site as a result of accidental pollution.
- g: **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 these ornithological features of the SPA as a result of in-combination effects during the operational phase of the Proposed Development

6. APPROACH TO THE IN-COMBINATION ASSESSMENT

324. The Habitats Regulations and the Offshore Marine Habitats and Species Regulations require the consideration of the potential effects of a project on European sites and Ramsar sites both alone and in-combination with other plans or projects.
325. 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;
 - submitted application(s) not yet determined; 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).
326. The in-combination assessment will consider all other relevant plans, projects and activities that are publicly available three months prior to the Proposed Development application.
327. 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 cumulative effects 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.

7. SUMMARY OF LSE

328. 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 and excludes all effects for which no LSE has been identified. These sites will be taken forward for consideration in the RIAA.

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 (offshore export cable corridor works only) Accidental pollution
		Operation and maintenance	Increase in SSC and sediment deposition (offshore export cable corridor works only) Changes in physical processes (offshore export cable corridor works only) Accidental pollution
	Large shallow inlets and bays	Construction / decommissioning	Increase in SSC and sediment deposition (offshore export cable corridor works only) Accidental pollution
		Operation and maintenance	Increase in SSC and sediment deposition (offshore export cable corridor works only) Changes in physical processes (offshore export cable corridor works only) Accidental pollution
	Reefs	Construction / decommissioning	Increase in SSC and sediment deposition (offshore export cable corridor works only) Accidental pollution
		Operation and maintenance	Increase in SSC and sediment deposition (offshore export cable corridor works only) Changes in physical processes (offshore export cable corridor works only) Accidental pollution
	Submerged or partially submerged sea caves	Construction / decommissioning	Increase in SSC and sediment deposition (offshore export cable corridor works only) Accidental pollution
		Operation and maintenance	Increase in SSC and sediment deposition (offshore export cable corridor works only) Changes in physical processes (offshore export cable corridor works only) Accidental pollution
	Grey seal (<i>Halichoerus grypus</i>)	Construction/ decommissioning	Underwater noise from piling Underwater noise from vessels Vessel collision risk Changes in prey availability Accidental pollution
		Operation and maintenance	Underwater noise from vessels Vessel collision risk Accidental pollution
Tweed Estuary SAC	Atlantic salmon (<i>Salmo salar</i>)	Construction / decommissioning	Underwater noise Accidental pollution
		Operation and maintenance	EMF Accidental pollution
	Sea lamprey (<i>Petromyzon marinus</i>)	Construction / decommissioning	Underwater noise Accidental pollution
		Operation and maintenance	EMF Accidental pollution
	River lamprey (<i>Lampetra fluviatilis</i>)	Construction / decommissioning	Underwater noise Accidental pollution
		Operation and maintenance	EMF Accidental pollution
River Tweed SAC	Atlantic salmon (<i>Salmo salar</i>)	Construction / decommissioning	Underwater noise Accidental pollution
		Operation and maintenance	EMF Accidental pollution

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact	
	Sea lamprey (<i>Petromyzon marinus</i>)	Construction / decommissioning	Underwater noise Accidental pollution	
		Operation and maintenance	EMF Accidental pollution	
	River lamprey (<i>Lampetra fluviatilis</i>)	Construction / decommissioning	Underwater noise Accidental pollution	
		Operation and maintenance	EMF Accidental pollution	
	River South Esk SAC	Atlantic salmon (<i>Salmo salar</i>)	Construction / decommissioning	Underwater noise Accidental pollution
		Freshwater pearl mussel (<i>Margaritifera margaritifera</i>)	Construction / decommissioning	Underwater noise Accidental pollution
River Tay SAC			Atlantic salmon (<i>Salmo salar</i>)	Construction / decommissioning
	Sea lamprey (<i>Petromyzon marinus</i>)	Construction / decommissioning	Underwater noise Accidental pollution	
	River lamprey (<i>Lampetra fluviatilis</i>)	Construction / decommissioning	Underwater noise Accidental pollution	
		River Dee SAC	Atlantic salmon (<i>Salmo salar</i>)	Construction / decommissioning
Freshwater pearl mussel (<i>Margaritifera margaritifera</i>)	Construction / decommissioning		Underwater noise Accidental pollution	
	River Teith SAC		Atlantic salmon (<i>Salmo salar</i>)	Construction / decommissioning
Sea lamprey (<i>Petromyzon marinus</i>)		Construction / decommissioning	Underwater noise Accidental pollution	
River lamprey (<i>Lampetra fluviatilis</i>)		Construction / decommissioning	Underwater noise Accidental pollution	
		Isle of May SAC	Grey seal (<i>Halichoerus grypus</i>)	Construction / decommissioning
Underwater noise from vessels				
Vessel collision risk				
Changes in prey availability				
Accidental pollution				
Operation and maintenance	Underwater noise from vessels			
Firth of Tay and Eden Estuary SAC	Harbour seal (<i>Phoca vitulina</i>)	Construction / decommissioning	Underwater noise from piling	
			Underwater noise from vessels	
			Vessel collision risk	
			Accidental pollution	
		Operation and maintenance	Underwater noise from vessels	
			Vessel collision risk	
			Accidental pollution	
Southern North Sea SAC	Harbour porpoise (<i>Phocoena phocoena</i>)	Construction / decommissioning	Underwater noise from piling	
			Accidental pollution	
Moray Firth SAC	Bottlenose dolphin (<i>Tursiops truncatus</i>)	Construction / decommissioning	Underwater noise from piling Accidental pollution	
Seabird Sites				
Outer Firth of Forth and St Andrew's Bay Complex pSPA	Gannet <i>Morus bassanus</i> (breeding)	Construction	Changes in prey availability	
		Construction / decommissioning	Accidental pollution	
		Operation and maintenance	Collision Accidental pollution	
		Guillemot <i>Uria aalge</i>		Disturbance / displacement

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
	(breeding and non-breeding)	Construction / decommissioning	Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
	Herring gull <i>Larus argentatus</i>	Construction / decommissioning	Accidental pollution
			Changes in prey availability
		Operation and maintenance	Accidental pollution
			Collision
	Kittiwake <i>Rissa tridactyla</i>	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Operation and maintenance	Changes in prey availability
			Disturbance / displacement
	(breeding and non-breeding)	Construction / decommissioning	Collision
			Barrier to movement
		Operation and maintenance	Accidental pollution
			Disturbance / displacement
	Puffin <i>Fratercula arctica</i>	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Operation and maintenance	Changes in prey availability
			Disturbance / displacement
	(breeding)	Construction / decommissioning	Barrier to movement
			Accidental pollution
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
	Razorbill <i>Alca torda</i>	Construction / decommissioning	Accidental pollution
			Disturbance / displacement
		Operation and maintenance	Changes in prey availability
			Disturbance / displacement
	(non-breeding)	Construction / decommissioning	Barrier to movement
			Accidental pollution
		Operation and maintenance	Disturbance / displacement
			Barrier to movement
	Seabird assemblage	Construction / decommissioning	Accidental pollution
			Disturbance / displacement
		Operation and maintenance	Changes in prey availability
			Disturbance / displacement
	(breeding and non-breeding)	Construction / decommissioning	Collision
			Barrier to movement
		Operation and maintenance	Accidental pollution
			Disturbance / displacement
	Arctic tern <i>Sterna paradisaea</i> (breeding)	Construction / decommissioning	Accidental pollution
			Accidental pollution
		Operation and maintenance	Accidental pollution
			Accidental pollution
	Common tern <i>Sterna hirundo</i> (breeding)	Construction / decommissioning	Accidental pollution
			Accidental pollution
		Operation and maintenance	Accidental pollution
			Accidental pollution
	Black-headed gull <i>Chroicocephalus ridibundus</i> (non-breeding)	Construction / decommissioning	Accidental pollution
			Accidental pollution
		Operation and maintenance	Accidental pollution
			Accidental pollution
	Common gull <i>Larus canus</i> (non-breeding)	Construction / decommissioning	Accidental pollution
			Accidental pollution
		Operation and maintenance	Accidental pollution
			Accidental pollution
	Little gull <i>Hydrocoloeus minutus</i> (non-breeding)	Construction / decommissioning	Accidental pollution
			Accidental pollution
		Operation and maintenance	Accidental pollution
			Accidental pollution

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
	Common scoter <i>Melanitta nigra</i> (non-breeding)		
	Eider <i>Somateria mollissima</i> (non-breeding)		
	Goldeneye <i>Bucephala clangula</i> (non-breeding)		
	Long-tailed duck <i>Clangula hyemalis</i> (non-breeding)		
	Red-breasted merganser <i>Mergus serrator</i> (non-breeding)		
	Red-throated diver <i>Gavia stellata</i> (non-breeding)		
	Slavonian grebe <i>Podiceps auritus</i> (non-breeding)		
	Velvet scoter <i>Melanitta fusca</i> (non-breeding)		
	Waterfowl assemblage (non-breeding)		
St Abb's Head to Fast Castle SPA	Guillemot <i>Uria aalge</i> (breeding)	Construction / decommissioning	Disturbance / displacement Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement Barrier to movement Accidental pollution
	Razorbill <i>Alca torda</i> (breeding)	Construction / decommissioning	Disturbance / displacement Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement Barrier to movement Accidental pollution
	Herring gull <i>Larus argentatus</i> (breeding)	Construction	Changes in prey availability
		Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision Accidental pollution
	Kittiwake <i>Rissa tridactyla</i>	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	Construction / decommissioning	Disturbance / displacement Accidental pollution
	(breeding)	Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement Collision Barrier to movement Accidental pollution
Northumberland Marine SPA	Arctic tern <i>Sterna paradisaea</i>	Construction / decommissioning	Disturbance / displacement Accidental pollution
		Construction	Changes in prey availability
	(Breeding)	Operation and maintenance	Disturbance / displacement Collision Barrier to movement Accidental pollution
	Guillemot <i>Uria aalge</i>	Construction / decommissioning	Disturbance / displacement Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement Barrier to movement Accidental pollution
	Puffin <i>Fratercula arctica</i>	Construction / decommissioning	Disturbance / displacement Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement Barrier to movement Accidental pollution
	Seabird assemblage	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 <i>Uria aalge</i>	Construction / decommissioning	Disturbance / displacement Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement Barrier to movement Accidental pollution
	Seabird assemblage	Construction / decommissioning	Disturbance / displacement Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement Barrier to movement Accidental pollution
Forth Islands SPA	Gannet <i>Morus bassanus</i>	Construction	Changes in prey availability
		Construction / decommissioning	Accidental pollution
	(breeding)	Operation and maintenance	Collision Accidental pollution
		Construction	Changes in prey availability

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
	Herring gull <i>Larus argentatus</i> (breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision Accidental pollution
	Lesser black-backed gull <i>Larus fuscus</i> (breeding)	Construction	Changes in prey availability
		Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision Accidental pollution
	Guillemot <i>Uria aalge</i> (breeding)	Construction / decommissioning	Disturbance / displacement Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement Barrier to movement Accidental pollution
	Puffin <i>Fratercula arctica</i> (breeding)	Construction / decommissioning	Disturbance / displacement Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement Barrier to movement Accidental pollution
	Razorbill <i>Alca torda</i> (breeding)	Construction / decommissioning	Disturbance / displacement Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement Barrier to movement Accidental pollution
	Kittiwake <i>Rissa tridactyla</i> (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
Fowlsheugh SPA	Fulmar <i>Fulmarus glacialis</i> (breeding)	Construction / decommissioning	Accidental pollution
	Guillemot <i>Uria aalge</i> (breeding)	Construction / decommissioning	Disturbance / displacement Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement Barrier to movement Accidental pollution
	Razorbill <i>Alca torda</i> (breeding)	Construction / decommissioning	Disturbance / displacement Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement Barrier to movement Accidental pollution
	Kittiwake <i>Rissa tridactyla</i>	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
	Herring gull <i>Larus argentatus</i>	Construction	Changes in prey availability
		Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Accidental pollution
	Seabird assemblage	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
Buchan Ness to Collieston Coast SPA	Fulmar <i>Fulmarus glacialis</i> (breeding)	Construction / decommissioning	Accidental pollution
		Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
	(breeding)	Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Kittiwake <i>Rissa tridactyla</i>	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
	(breeding)		Collision
			Barrier to movement
			Accidental pollution
	Seabird assemblage	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
Troup, Pennan and Lion's Heads SPA	Fulmar <i>Fulmarus glacialis</i> (breeding)	Construction / decommissioning	Accidental pollution
		Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
	(breeding)	Operation and maintenance	Disturbance / displacement
			Barrier to movement
			Accidental pollution
	Razorbill <i>Alca torda</i>	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
	(breeding)		Barrier to movement
			Accidental pollution
	Kittiwake <i>Rissa tridactyla</i>	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
	(breeding)		Collision

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
	Seabird assemblage (breeding)		Barrier to movement
			Accidental pollution
		Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
East Caithness Cliffs SPA	Fulmar <i>Fulmarus glacialis</i> (breeding)	Construction / decommissioning	Accidental pollution
	Kittiwake <i>Rissa tridactyla</i> (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
Flamborough and Filey Coast SPA	Gannet <i>Morus bassanus</i> (breeding)	Construction	Changes in prey availability
		Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Accidental pollution
	Kittiwake <i>Rissa tridactyla</i> (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
North Caithness Cliffs SPA	Fulmar <i>Fulmarus glacialis</i> (breeding)	Construction / decommissioning	Accidental pollution
	Kittiwake <i>Rissa tridactyla</i> (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Collision
			Barrier to movement
			Accidental pollution
	Puffin <i>Fratercula arctica</i> (breeding)	Construction / decommissioning	Disturbance / displacement
			Accidental pollution
		Construction	Changes in prey availability
		Operation and maintenance	Disturbance / displacement
			Barrier to movement

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
	Seabird assemblage (breeding)		Accidental pollution
		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)			
Firth of Forth SPA and Ramsar site	Bar-tailed godwit <i>Limosa lapponica</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
	Accidental pollution		
	Common Scoter <i>Melanitta nigra</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
	Accidental pollution		
	Cormorant <i>Phalacrocorax carbo</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
	Accidental pollution		
	Curlew <i>Numenius arquata</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
	Accidental pollution		
	Dunlin <i>Calidris alpina alpina</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
	Accidental pollution		
	Eider <i>Somateria mollissima</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
	Accidental pollution		
	Golden plover <i>Pluvialis apricaria</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
	Accidental pollution		
	Goldeneye <i>Bucephala clangula</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
Accidental pollution			
Great crested grebe <i>Podiceps cristatus</i> (non-breeding)	Construction / decommissioning	Accidental pollution	
	Operation and maintenance	Collision	
		Barrier to movement	
Accidental pollution			
Grey plover <i>Pluvialis squatarola</i> (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 <i>Calidris canutus</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
	Lapwing <i>Vanellus vanellus</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
	Long-tailed duck <i>Clangula hyemalis</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
	Mallard <i>Anas platyrhynchos</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
	Oystercatcher <i>Haematopus ostralegus</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
	Pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
	Red-breasted merganser <i>Mergus serrator</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
	Red-throated diver <i>Gavia stellata</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
	Redshank <i>Tringa totanus</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
	Ringed plover <i>Charadrius hiaticula</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
	Sandwich tern <i>Sterna sandvicensis</i> (passage)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement
	Scaup <i>Aythya marila</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision
			Barrier to movement

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
	Shelduck <i>Tadorna tadorna</i> (non-breeding)		Accidental pollution
		Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision Barrier to movement Accidental pollution
	Slavonian grebe <i>Podiceps auritus</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision Barrier to movement Accidental pollution
	Turnstone <i>Arenaria interpres</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision Barrier to movement Accidental pollution
	Velvet scoter <i>Melanitta fusca</i> (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 <i>Anas penelope</i> (non-breeding)	Construction / decommissioning	Accidental pollution
		Operation and maintenance	Collision Barrier to movement Accidental pollution
	Dunlin <i>Calidris alpina alpina</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
		Operation and maintenance	Collision Barrier to movement
	Greylag goose <i>Anser anser</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
		Operation and maintenance	Collision Barrier to movement
	Knot <i>Calidris canutus</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
		Operation and maintenance	Collision Barrier to movement
	Oystercatcher <i>Haematopus ostralegus</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
		Operation and maintenance	Collision Barrier to movement
	Pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
		Operation and maintenance	Collision Barrier to movement
	Redshank <i>Tringa totanus</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
		Operation and maintenance	Collision Barrier to movement
	Shelduck <i>Tadorna tadorna</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
		Operation and maintenance	Collision Barrier to movement
	Waterfowl assemblage (non-breeding)	Operation and maintenance	Collision Barrier to movement
		Operation and maintenance	Collision Barrier to movement
		Operation and maintenance	Collision

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
	Wigeon <i>Anas penelope</i> (non-breeding)	Operation and maintenance	Barrier to movement
Firth of Tay and Eden Estuary SPA and Ramsar site	Bar-tailed godwit <i>Limosa lapponica</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Common Scoter <i>Melanitta nigra</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Cormorant <i>Phalacrocorax carbo</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Dunlin <i>Calidris alpina alpina</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Eider <i>Somateria mollissima</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Goldeneye <i>Bucephala clangula</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Goosander <i>Mergus merganser</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Grey plover <i>Pluvialis squatarola</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Greylag goose <i>Anser anser</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Icelandic black-tailed godwit <i>Limosa limosa islandica</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Long-tailed duck <i>Clangula hyemalis</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Oystercatcher <i>Haematopus ostralegus</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Red-breasted merganser <i>Mergus serrator</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Redshank <i>Tringa totanus</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Sanderling <i>Calidris alba</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Shelduck <i>Tadorna tadorna</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Velvet scoter <i>Melanitta fusca</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
			Collision

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
	Waterfowl assemblage (non-breeding)	Operation and maintenance	Barrier to movement
Ythan Estuary, Sands of Forvie and Meikle Loch SPA and Ramsar site	Eider <i>Somateria mollissima</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Lapwing <i>Vanellus vanellus</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Redshank <i>Tringa totanus</i> (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)			
Greenlaw Moor SPA and Ramsar site	Pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
Cameron Reservoir SPA and Ramsar site	Pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
Din Moss – Hoselaw Loch SPA and Ramsar site	Greylag goose <i>Anser anser</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
Fala Flow SPA and Ramsar site	Pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
Loch of Kinnordy SPA and Ramsar site	Greylag goose <i>Anser anser</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
Gladhouse Reservoir SPA and Ramsar site	Pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
Loch Leven SPA and Ramsar site	Cormorant <i>Phalacrocorax carbo</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Gadwall <i>Anas strepera</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Goldeneye <i>Bucephala clangula</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
			Collision

European Site	Relevant Qualifying Interest Feature(s)	Project Phase	Impact
	Pink-footed goose <i>Anser brachyrhynchus</i> (non-breeding)	Operation and maintenance	Barrier to movement
	Pochard <i>Aythya ferina</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Shoveler <i>Anas clypeata</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Teal <i>Anas crecca</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Tufted duck <i>Aythya fuligula</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Waterfowl assemblage (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Whooper swan <i>Cygnus cygnus</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
South Tayside Goose Roosts SPA and Ramsar site	Greylag goose <i>Anser anser</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement
	Pink-footed goose <i>Anser brachyrhynchus</i> (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 <i>Anser brachyrhynchus</i> (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 <i>Anser fabalis fabalis</i> (non-breeding)	Operation and maintenance	Collision Barrier to movement

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Annex A Standard Data Forms

Annex B Baseline Seal Information for the FTOWDG Area

