Ossian Array

Habitats Regulation Appraisal

Stage 1: Likely Significant Effects Screening Report

CONTENTS

TABLES

FIGURES

GLOSSARY

Term	Definition
1SW Atlantic Salmon	Maturing Atlantic salmon that return to natal rivers to spawn after spending one winter at sea. Also referred to as ‘grilse’.
Appropriate Assessment	An assessment to determine the implications of a plan or project on a European site in view of that site’s conservation objectives. An Appropriate Assessment forms part of the Habitats Regulations Appraisal (HRA) and is required when a plan or project (either alone or in-combination with other plans or projects) is likely to have a significant effect on a European site.
Annex I Habitat	A natural habitat type of community interest, defined in Annex I of the Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (Habitats Directive). The designation of Special Areas of Conservation is required in the UK to ensure the conservation of these habitats. The protection afforded to sites designated prior to EU Exit persists in UK law.
Annex II Species	Animal or plant species of community interest, defined in Annex II of the Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (Habitats Directive). The designation of Special Areas of Conservation is required in the UK to ensure the conservation of these species. The protection afforded to sites designated prior to EU Exit persists in UK law.
Array	Offshore components of Ossian, including infrastructure such as wind turbines, offshore substation platforms, and inter-array/interconnector cables.
Competent Authority	The term derives from the Habitats Regulations and relates to the exercise of the functions and duties under those Regulations. Competent authorities are defined in the Habitat Regulations as including "any Minister, government department, public or statutory undertaker, public body of any description or person holding a public office". In the context of a plan or project, the competent authority is the authority with the power or duty to determine whether or not the proposal can proceed.
EU Exit	The withdrawal of the United Kingdom from the European Union
Habitats Regulations	The Conservation (Natural Habitats, & C.) Regulations 1994, the Conservation of Habitats and Species Regulations 2017, and the Conservation of Offshore Marine Habitats and Species 2017.
Habitats Regulations Appraisal	A process required by the Habitats Regulations of identifying likely significant effects of a plan or project on a European site and (where Likely Significant Effects are predicted or cannot be discounted) carrying out an appropriate assessment to ascertain whether the plan or project will adversely affect the integrity of the European sites. If adverse effects on integrity cannot be ruled out, the latter stages of the process require consideration of the derogation provisions in the Habitats Regulations.
Likely Significant Effect	Any effect that may reasonably be predicted as a consequence of a plan or project that may affect the conservation objectives of the features for which the European site was designated but excluding trivial or inconsequential effects. A likely effect is one that cannot be ruled out on the basis of objective information. A ’significant’ effect is a test of whether a plan or project could undermine the site’s conservation objectives.
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.
MSW Atlantic salmon	Non-maturing Atlantic salmon that return to natal rivers after two or more winters at sea.
National Site Network	The National Site Network comprises Special Protection Areas and Special Areas of Conservation designated (or proposed) on EU Exit Day, and which formerly formed part of the Natura 2000 network. The term “national site network” is used in each of the Habitats Regulations and the terms refer to the same network of sites.
Natura 2000 network	A coherent European ecological network of Special Areas of Conservation and Special Protection Areas comprising sites located within European Union Member States.
Odontocete	Toothed whales, including harbour porpoise and bottlenose dolphin.
Ossian	All components of the offshore wind farm, including the Array, the Proposed offshore export cable corridor(s), Proposed onshore cable corridor(s) and Proposed landfall location(s)
Ossian Offshore Wind Farm Limited (OWFL)	Joint venture between Scottish and Southern Energy Renewables (SSER), Copenhagen Infrastructure Partners (CIP) and Marubeni Corporation (Marubeni).
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.
Site boundary	The offshore area in which the Array will be constructed.
Site of Community Importance	Defined in the Habitats Directive as a site which, in the biogeographical region or regions to which it belongs, contributes significantly to the maintenance or restoration at a favourable conservation status of a natural habitat type in Annex I, or of a species in Annex II, of the Habitats Directive and may also contribute significantly to the coherence of the Natura 2000 network. The site may also contribute significantly to the maintenance of biological diversity within the biogeographic region or regions concerned. For animal species ranging over wide areas, SCIs shall correspond to the places within the natural range of such species which represent the physical or biological factors essential to their life and reproduction.
Special Areas of Conservation	Special Areas of Conservation are areas designated for the conservation of certain plant and animal species listed in the Directive.
Special Protection Areas	Special Protection Areas are sites that are designated to protect rare or vulnerable birds (as listed on Annex I of the Directive 2009/147/EC on the conservation of wild birds), as well as regularly occurring migratory species.

ACRONYMS

Acronym	Description
1SW	One Sea Winter
BDMPS	Biologically Defined Minimum Population Scales
CIP	Copenhagen Infrastructure Partners
CoCP	Code of Construction Practice
CTV	Crew Transfer Vessel
cSAC	Candidate SAC
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EMP	Environmental Management Plan
EU	European Union
FAD	Fish Aggregation Device
FCS	Favourable Conservation Status
HRA	Habitats Regulations Appraisal
HNDFUE	Holistic Network Design Follow Up Exercise
IAMMWG	Inter-Agency Marine Mammal Working Group
IMO	International Maritime Organisation
INNS	Invasive Non-Native Species
INNSMP	Invasive Non-Native Species Management Plan
LAT	Lowest Astronomical Tide
LSE	Likely Significant Effect
MARPOL	International Convention for the Prevention of Pollution from Ships
MCAA	Marine and Coastal Access Act
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MPCP	Marine Pollution Contingency Plan
MS-LOT	Marine Scotland - Licensing Operations Team
MSS	Marine Scotland Science
MSW	Multi Sea Winter
MU	Management Units
NSIP	Nationally Significant Infrastructure Projects
O&M	Operation and Maintenance
Ossian OWFL	Ossian Offshore Wind Farm Limited
OSP	Offshore Substation Platform
OSPAR	Oslo/Paris Convention
OTNR	Offshore Transmission Network Review
OWFL	Offshroe Wind Farm Limited
PDE	Project Design Envelope
pSAC	Possible Special Area of Conservation
pSPA	Possible Special Protected Area
PTS	Permanent Threshold Shift
RIAA	Report to Inform Appropriate Assessment
ROV	Remotely Operated Vehicle
SAC	Special Area of Conservation
SCANS	Small Cetaceans in European Atlantic Waters of the North Sea
SCI	Site of Community Importance
SCOS	Special Committee on Seals
SMP-OWE	Sectoral Marine Plan for Offshore Wind
SMRU	Sea Mammal Research Unit
SNCB	Statutory Nature Conservation Body
SNH	Scottish Natural Heritage (now NatureScot)
SOV	Support Operations Vessel

Acronym	Description
SPA	Special Protected Area
SSC	Suspended Sediment Concentration
SSER	SSE Renewables
TTS	Temporary Threshold Shift
UK	United Kingdom
UXO	Unexploded Ordnance
ZoI	Zone of Influence

UNITS

Unit	Description
km	Kilometre
km^2	Kilometres squared
MW	Megawatt
m	Metre
m^2	Metres squared
nm	Nautical mile
µT	Microtesla

1. INTRODUCTION

1.1. OVERVIEW

1. Ossian Offshore Wind Farm Limited (Ossian OWFL), a joint venture between SSE Renewables (SSER), Marubeni Corporation (Marubeni) and Copenhagen Infrastructure Partners (CIP), hereafter referred to as 'the Applicant', propose to develop Ossian (Figure 1.1). Ossian is a proposed wind farm located off the east coast of Scotland, approximately 80 km south-east of Aberdeen.

2. Ossian includes both the offshore and onshore infrastructure required to generate and transmit electricity from the Array to a power transmission substation (location and parameters to be confirmed). The Array will be developed within the site boundary (i.e. the total area within which the Array will be located), with the parameters and exact location of the Array to be confirmed. The Array is the subject of this Offshore Stage 1 Screening Report.

3. This Array Stage 1 Screening Report considers all the offshore infrastructure within the Array only. The Applicant intends to submit separate consents, licences, and permissions for the Proposed offshore export cable corridor(s), due to the uncertainty associated with the ongoing Offshore Transmission Network Review (OTNR) and National Grid Holistic Network Design Follow Up Exercise (HNDFUE), as well as the onshore infrastructure. Therefore, the Proposed offshore export cable corridor and onward onshore grid connection will not be discussed further within this Array Stage 1 Screening Report and will be subject to a separate Habitats Regulation Appraisal (HRA) as required.

4. The Applicant will seek the following consents, licences, and permissions for the Array:

   - a Section 36 consent under the Electricity Act 1989; and
   - a marine licence under the Marine and Coastal Access Act (MCAA) 2009.

1.2. HABITATS REGULATIONS APPRAISAL

5. This Stage 1 Screening Report has been produced to inform the HRA for the Array. It provides information to enable the screening of the Array with respect to its potential to have a Likely Significant Effect (LSE) on European or Ramsar sites. The scope of this document covers all relevant European or Ramsar sites and relevant qualifying interest features seaward of Mean High Water Springs (MHWS). Where no LSE from the Array is predicted, European sites are proposed to be screened out of further assessment. Where LSE cannot be ruled out at this stage, European sites are screened in for further consideration in the Stage 2 Appropriation Assessment (paragraph 10).

6. The requirement for the consideration of potential impacts of the Array upon European sites is derived from the European Union's (EU) Habitats Directive[1]. In Scotland, the Habitat's Directive was initially transposed into domestic law by the Conservation (Natural Habitats, & C.) Regulations 1994 (as amended); it was updated in 2017 by the Conservation of Habitats and Species Regulations 2017 on land and inshore waters (out to 12nm); and the Conservation of Offshore Marine Habitats and Species Regulations 2017 in offshore waters (greater than 12 nm from land). These regulations are collectively referred to as the Habitats Regulations.

7. Following the United Kingdom's (UK) departure from the EU on 31 December 2020 (EU Exit), the UK is no longer an EU Member State. Notwithstanding, the Directive, as implemented by the Habitats Regulations, continues to provide the legislative backdrop for HRA. The changes implemented by the Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019 ("The 2019 Regulations") have implemented only minor changes to the HRA regime[2]. These changes are considered to have no material implications on the requirement or process for a HRA for Ossian.

8. Under the Habitats Regulations, an HRA must be carried out on all plans and projects that are likely to have significant effects on European sites. This includes, Special Areas of Conservation (SACs), candidate SACs (cSACs), Sites of Community Importance (SCIs), Special Protection Areas (SPAs) and as a matter of policy, possible SACs (pSACs), potential SPAs (pSPAs) and Ramsar Sites (i.e. listed under the Ramsar Convention on Wetlands of International Importance).

9. In accordance with the Scottish Government's EU Exit guidance, the term "European site" has been retained in this report to refer to the above sites that are protected in Scotland, the rest of the UK, and in EU Member States (Scottish Government, 2020). However, European sites located in the UK are no longer part of the Natura 2000 network and are now included as part of the National Site Network. European sites are defined in full in section 2.2

10. The European Commission's (2021) guidance identifies a staged process to the assessment of plans and projects on European sites:

    - Stage One: Screening;
    - Stage Two: The Appropriate Assessment; and
    - Stage Three: Derogation from Article 6(3) under certain conditions.

11. Although this guidance is from the European Commission and the UK is no longer a member of the EU, the staged process to the assessment of plans and projects on European sites remains unchanged. A flowchart illustrating the approach, adapted from the European Commission (2021), is presented in Figure 2.1.

1.3. PURPOSE OF THIS REPORT

12. This document provides the information to support screening for LSE required by the Habitats Regulations. It comprises the screening stage and therefore provides information to enable the screening of Ossian with respect to its potential to have a LSE on European sites. This LSE Screening Report has been developed alongside the Array Environmental Impact Assessment (EIA) Scoping Report. This LSE Screening Report has been circulated alongside the Array EIA Scoping Report for consultation in parallel with the formal Scoping consultation.

13. Although the focus of this report is the Array, any potential impacts upon coastal receptors that may be present within the Array (such as diadromous fish migration or seabird foraging) will also be considered in this report.

14. The screening exercise presented in this report is based on the current understanding of the baseline environment and proposed activities associated with the Array and is based on the project and site-specific information currently available. Any changes which may arise as a result of further environmental surveys, assessment work, consultee responses, and/or refinements to the design of the Array will be reflected in the Report to Inform Appropriate Assessment (RIAA), and/or subsequent HRA reporting. It is not anticipated that any of the aforementioned changes would alter the outcome of the screening exercise due to the precautionary approach (including buffers) undertaken in this report (refer to section 4 for further details).

1.4. STRUCTURE OF THIS REPORT

15. The structure of this LSE Screening Report is as follows:

    - section 2 – concise overview of the HRA process and legislative context, including implications of the UK's departure from the EU;
    - section 3 – description of the key elements of the Array;

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

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

- section 4 – initial identification of European sites and features that may potentially be affected by the Array;
- section 5 – determination of the potential for LSE to arise with respect to relevant qualifying interest features of the European sites under consideration, presented in Table 5.1 to Table 5.51; and
- section 6 – a summary of the European sites and relevant qualifying interest features for which the screening process has identified potential for LSEs.

1.5. ARRAY OVERVIEW

16. The design of the Array presented in this LSE Screening Report, provides a summary of the Array EIA Report project description, for which necessary consent applications will be sought in due course. At this stage of the development, ongoing engineering and feasibility work is being progressed to refine the design, therefore, the Project Design Envelope (PDE) is necessarily wide to allow flexibility in the design of the Array.

17. The site boundary is approximately 80 km south-east of Aberdeen and comprises an area of approximately 859 km^2 (Figure 1.1). The Array, which includes the offshore infrastructure listed in paragraph 18 below, will be situated within the site boundary.

18. The key offshore components include:

- floating wind turbines (each comprising a tower section, nacelle and three rotor blades) and associated floating support structures and foundations;
- Offshore Substation Platforms (OSPs) and associated floating support structures and foundations or fixed jacket foundations;
- moorings for each floating substructure;
- anchors or piles for each mooring line; and
- a network of inter-array cables and interconnector cables linking the individual wind turbines to OSPs.

19. Further description of these key elements is provided in section 3.

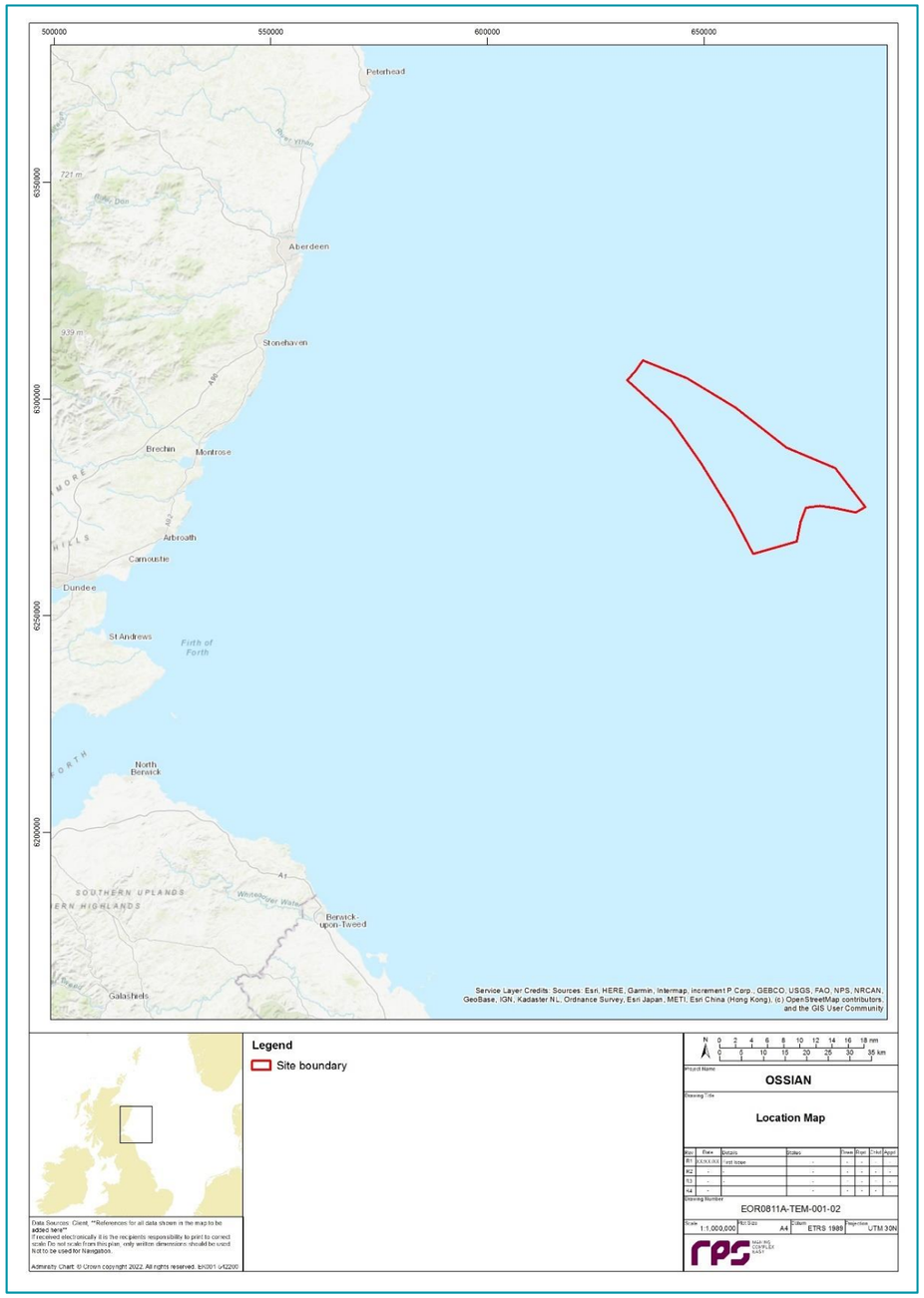


Figure 1.1: Location of Ossian Site Boundary

1.6. RELEVANT CONSULTATIONS

20. A summary of the details of the consultation with relevant stakeholders and Statutory Nature Conservation Bodies (SNCBs) undertaken to date is presented in Table 1.1.

Table 1.1: Summary of Key Consultation To Date on LSE Screening for the Array

Date	Consultee(s)	Type of Consultation	Summary of Consultation	Where and How Addressed
Benthic Ecology				
14 November 2022	Marine Scotland Science (MSS), Marine Scotland – Licencing Operations Team (MS-LOT), NatureScot	Teleconference	Pre-scoping workshop. The list of designated sites with benthic ecology features in the vicinity of the Array was presented. It was noted that due to the distance between the Array and the closest European site designated for Annex I benthic features (Berwickshire and North Northumberland Coast SAC; 113.98 km), it was assumed that benthic features would not be screened into the RIAA. Stakeholders did not raise concerns at this approach.	Section 4.1 provides evidence for and summarises that no European sites designated for Annex I benthic habitats or features were suitable for inclusion within the LSE Screening.
Diadromous Fish				
14 November 2022	MSS, MS-LOT, NatureScot	Teleconference	Pre-scoping workshop. Approach to LSE Screening presented to stakeholders. SACs to be considered were proposed, and agreement was sought for a 100 km buffer around the Array, whilst also considering evidence of fish migration along the east coast of Scotland. MSS advised that the consideration should be given to the River Spey SAC (181.56 km from the site boundary) and other SACs further north within the Moray Firth, as there is potential for diadromous fish to migrate along the east coast of Scotland.	All sites that flow into the Moray Firth have been included under criterion 2 (see section 4.2.1).
Marine Mammals				
17 November 2022	MSS, MS-LOT, NatureScot	Teleconference	Pre-scoping workshop. Approach to LSE Screening presented to stakeholders. It was noted that LSE Screening will be based upon species Management Units (MUs) for harbour porpoise *Phocoena phocoena*, bottlenose dolphin *Tursiops truncatus* (east coast sites only), grey seal *Halichoerus grypus* and harbour seal *Phoca vitulina*. Foraging ranges for seals will be used to inform the LSE Screening buffer - 100 km for grey seal and 40 km to 50 km for harbour seal as a precaution. NatureScot noted that they use 50 km for harbour seal and 20 km for grey seal based on SACs in Scotland because they are classed as breeding sites.	Paragraphs 82 to 87 in section 4.3 discuss the buffers to be used for each Annex II marine mammal species. Precautionary 100 km buffers were adopted for both seal species based on telemetry data and preliminary results from site-specific aerial surveys.
Ornithology				
14 November 2022	MSS, MS-LOT, NatureScot	Teleconference	Pre-scoping workshop. Proposed approach to LSE Screening presented to stakeholders. Stakeholders were content with the approach set out and noted various guidance coming out with regard to offshore ornithology, including guidance on marine SPAs. The Ossian consents team noted that there was a need for a working list of guidance and agreement of a freeze on the suite of guidance incorporated in the EIA and RIAA should be sought with stakeholders.	Section 4.4 sets out the approach to screening in ornithology receptors. It is noted that since the scoping workshop NatureScot have now released a number of guidance notes which will be taken into account the assessment of ornithology receptors where LSE was identified, as detailed in section 5.4 to inform the HRA.

2. HABITATS REGULATIONS PROCESS

2.1. LEGISLATIVE CONTEXT

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

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

2.2. EUROPEAN SITES POST EU EXIT

23. The network of internationally important nature conservation sites and designated areas that span Europe are subject to the HRA process, established under the Habitats Directive. European sites located within EU Member States are combined, to form an international Europe-wide network of designated sites, and the sites may be referred to as Natura 2000 Sites. For EU Member States (and previously for the UK) the following protection is designated for these sites under the Habitats Directive:

- SACs are designated under the Habitats Directive to promote the protection of flora, fauna and habitats; and
- SPAs are designated to protect rare, vulnerable and migratory birds.

24. Following the UK's exit from the EU, European sites within the UK are no longer included in the Natura 2000 network (nor referred to as Natura 2000 Sites). Instead, the UK sites combine to form the UK's own 'National Site Network', which consists of European sites in the UK that were already designated (i.e. they were established under the Habitats Directive) on 31 December 2020, or were proposed to the European Commission before that date. It also includes any new sites that were designated under the Habitats Regulations through an amended designation process. Post EU Exit, the European Commission is no longer informed or consulted in the final stages of the derogation procedure for those sites which are part of the UK National Site Network.

25. Management objectives for the National Site Network are established in the 2019 Regulations and are referred to as the network objectives. The objectives in relation to the National Site Network are to:

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

2.3. THE PROCESS

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

27. Neither the Habitats Regulations nor the Habitats Directive explicitly define the assessment process to be followed to test the potential effects of proposed plans and projects on European sites. However, the HRA process is generally recognised as a progressive, three stage process built around the wording of Article 6(3) and 6(4) of the Habitats Directive, with the outcome at each stage defining the requirement for and scope of the next. Compliance with the requirements of the Directive can be demonstrated if the stages are followed in the correct and particular sequence. These stages are summarised in paragraph 10 above and in Figure 2.1

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

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

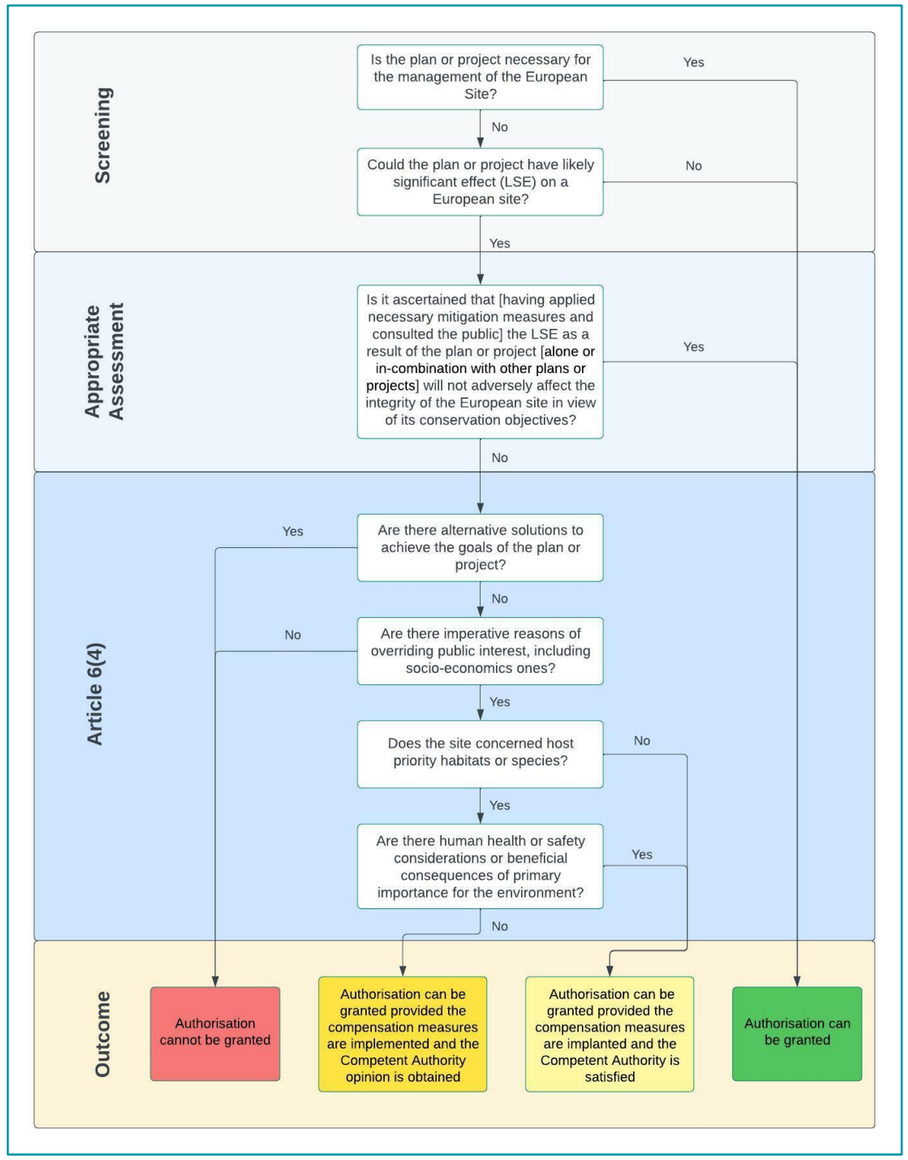


Figure 2.1: Stages in the Habitats Regulations Appraisal Process (Adapted from European Commission, 2021)[3]

2.4. PROCESS FOR IDENTIFYING SITES AND FEATURES

30. To facilitate the identification of the European sites and features to be considered in the LSE Screening for the Array, a pre-screening of European sites and features has been undertaken. This approach is considered to be appropriate due to the large spatial scale of the Array, 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.

31. 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 Array, the anticipated Zone of Influence (ZoI) of potential impacts associated with the Array, and the ecology and distribution of qualifying interest features.

32. 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 Array and any European sites; all sites with an overlapping boundary are screened in to be taken forward for determination of LSE (criterion 1).

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

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

Table 2.1: Criteria for Initial Identification of Relevant European Sites

Order of Consideration	Criteria Used for Initial Identification of Relevant European Sites
1	The Array overlaps with one or more European or Ramsar sites.
2	European or Ramsar site with qualifying mobile features (e.g. Annex I birds, Annex II marine mammals, shellfish or diadromous fish species) whose ranges overlaps with the Array (e.g. foraging, overwintering, breeding, or natural habitat ranges).
3	European or Ramsar sites and/or qualifying interest features located within the potential ZoI of impacts associated with the Array (e.g. habitat disturbance, noise and disturbance/displacement).

35. The outcome of this initial identification results in the exclusion of sites where there is no potential for LSE due to lack of potential overlap as defined by the criteria detailed above and in Table 2.1. Sites identified as having a potential for LSEs due to overlap with the Array under the three criteria, are taken forward for assessment of LSE in section 5.

[3] It should be noted that although the UK is no longer part of the EU, the approach presented here is still undertaken and is therefore applicable to this LSE Screening Report.

2.5. OFFSHORE WIND ENERGY – DRAFT SECTORAL MARINE PLAN: HABTIATS REGULATIONS APPRAISAL

36. As part of Scotland's commitment to long-term decarbonisation of the energy sector, the Scottish Government produced a Sectoral Marine Plan for Offshore Wind (SMP-OWE) (Scottish Government 2020) (hereafter referred to as the plan), which was adopted in October 2020 and built upon the 2013 Draft Sectoral Marine Plan for Offshore Renewable Energy in Scottish Waters (Scottish Government, 2013). The plan identified 15 Plan Options for offshore wind development in Scotland. The plan constitutes the bases for the Crown Estate Scotland's ScotWind seabed leasing round. The plan was developed in combination with a HRA process, in order to assess the plan's potential effects on European sites. This plan-level HRA process was undertaken as a sequence of discrete stages.

37. The plan-level HRA process included a pre-screening stage, which identified an initial list of 652 European sites, and their qualifying interest habitats and species, for which there could be a LSE (or where the possibility of a LSE could not be excluded). A 100 km buffer around the Plan Options was used to identify these European sites. Following the main screening process, a total of 468 European sites were identified, this consisted of the following:

- 267 SACs (including cSACs and SCIs);
- 150 SPAs (including pSPAs); and
- 51 Ramsar sites (Scottish Government, 2019).

38. Of these 468 sites, 107 were non-UK sites screened in due to the presence of mobile features (e.g. cetaceans and/or birds) with ranges that regularly exceeded 100 km.

39. Overall, it was concluded that the plan would not lead to adverse effects on the integrity of European sites either alone or in-combination with other plans and projects, provided that the project-level HRAs are conducted, an iterative plan review is undertaken, and that a temporal moratorium on development within certain areas (E3 and NE2-6) is applied. This LSE Screening Report builds on the conclusions of the plan level HRA in light of more recent developments on the nature, scale, and location of the Array. It should be noted that the Scottish Government will revise the plan and plan level HRA in 2023 and publish the consultations and amendments to the plan in due course.

3. PROJECT DESCRIPTION

3.1. INTRODUCTION

40. This section of the LSE Screening Report provides a concise summary of the Array and describes activities associated with the construction, operation and maintenance, and decommissioning. The design and components for the Array are based upon design information provided by the Applicant and the current understanding of the baseline environment from survey work.

3.2. ARRAY

41. They key components of the Array are likely to include:

- up to 270 turbines;
- up to six OSPs and associated support structures and foundations;
- moorings for each floating substructure, including anchors or piles for each mooring line;
- a network of inter-array cables, linking the individual turbines to each other and to the OSPs, including inter-connections between substations (totalling approximately 1,515 km); and
- ancillary elements, including scour protection and clump weights.

3.2.1. WIND TURBINES, FOUNDATIONS AND SUPPORT STRUCTURES

42. The Array will include up to 270 floating wind turbines, with the final number dependent on the capacity of individual wind turbines and the results of environmental and engineering surveys. The layout of the wind turbines will be developed to effectively make use of the available wind resource and the suitability of seabed conditions, whilst still ensuring that the environmental effects and impacts on other marine users (such as commercial fisheries and shipping) are kept to a minimum. Confirmation of the final layout of the wind turbines will occur at the final design stage (post-consent) and in consultation with relevant stakeholders.

43. As the wind turbine substructures will be floating, they require anchoring and mooring systems. These substructures will be fixed to the seabed with up to nine mooring lines per foundation, and anchored via either catenary, semi taut, or taut anchor mooring lines. The anchor mooring systems are currently being considered, with further detail provided in the Project Description chapter of the Array EIA Scoping Report.

44. The maximum design envelope for wind turbines and anchoring is presented in Table 3.1.

Table 3.1: Maximum Design Envelope for Wind Turbines and Anchoring

Parameter	Maximum Design Envelope
Wind Turbines	
Maximum number of wind turbines	270
Maximum rotor diameter (m)	350
Maximum hub height above LAT (m)	224
Minimum blade clearance above LAT (m)	To be confirmed post-scoping
Maximum blade tip height above LAT (m)	399
Minimum turbine spacing (m)	1,000 in all directions
Anchor Mooring Lines	
Anchor mooring line types considered	• Catenary • Semi Taut • Taut
Maximum number of mooring lines and anchors (per foundation	9
Seabed Anchoring	
Anchor type	• Driven pile • Suction pile • Drag embedded anchors • Vertical loading anchors • Suction embedded plate anchors • Gravity anchors • Drilled and grouted anchors • Dynamically installed anchors

3.2.2. OFFSHORE SUBSTATION PLATFORMS

45. Up to six OSPs may be required for the Array, in order to transform electricity generated by the wind turbines to a higher voltage, allowing the power to be efficiently transmitted directly to shore or to a wider offshore grid network. The size of the OSP topside will be dependent on the final electrical set up for the offshore wind farm but it is expected to be up to 130 m (length) by 110 m (width), and approximately 70 m in height (above LAT), excluding the helideck or lighting protection (Table 3.2).

46. The OSPs will be supported by either floating or fixed substructures. Further detail on the design of the OSPs and the support structures is presented in the Project Description chapter of the Array EIA Scoping Report, with further detail on the OSP topside specifications to be provided in the Project Description chapter of the Array EIA Report.

Table 3.2: Maximum Design Envelope for OSPs

Parameter	Maximum Design Envelope
Maximum number of OSPs	6
Length of topside (m)	130
Width of topside (m)	110
Height (excluding helideck or lightning protection) (m)	70

3.2.3. SCOUR PROTECTION FOR FOUNDATIONS

47. Natural hydrodynamic and sedimentary processes can cause seabed erosion and ‘scour hole’ formation around foundation structures. Scour protection can mitigate these effects; commonly used scour protection includes rocks, polypropylene fronds, and concrete blocks. The type and volume of scour protection required will vary depending on the foundation types considered, and the final parameters will be decided once the design of the foundation structures is finalised. Further detail on the different potential scour protection is presented in the Project Description chapter of the Array EIA Scoping Report.

3.2.4. INTER-ARRAY CABLES

48. Inter-array cables carry the electrical current produced by the wind turbines to an OSP. It is proposed that dynamic inter-array cables are used, so as not to hinder the movement of the floating wind turbine substructures. Several cable designs may be used; however, a 'lazy-s' configuration is the most likely, which allows extension of the cables in response to movement of the floating substructures. The inter-array cables will be laid on the seabed from the point at which no movement is expected. The static section will be buried where possible. Further detail on the inter-array cables is presented in the Project Description chapter of the Array EIA Scoping Report and will be refined in the Project Description chapter of the Array EIA Report and finalised, post-application, at the final design stage. The maximum design envelope for inter-array cables is presented in Table 3.3.

Table 3.3: Maximum Design Envelope for Inter-Array Cables

Parameter	Maximum Design Envelope
Maximum total cable length (km)	1,515
Cable installation methodology	Cable plough/ jet trencher/ mass flow excavator/ mechanical trencher
Maximum width of cable trench (m)	5
Maximum width of seabed affected by instillation tool per cable (m)	20
Maximum area of seabed disturbance from cable burial (including sandwave and boulder clearance activities) (km^2)	30.3

3.3. OFFSHORE CONSTRUCTION PROGRAMME

49. Construction of the Array is expected to occur over a period of nine years, and include the following construction activities:

- seabed preparation (including sand wave and boulder clearance, Unexploded Ordnance (UXO) clearance, and pre-construction surveys (including geophysical surveys));
- instillation of anchoring and mooring;
- instillation and integration of wind turbines and OSPs; and
- instillation of inter-array and interconnector cables.

50. It should be noted that geophysical survey activities are subject to a separate marine licence and all information regarding these activities will be submitted in a separate application. Any potential impacts to Annex I habitats and Annex II diadromous fish and shellfish, marine mammal, and ornithological features of European sites as a result of geophysical survey activities are therefore out with the scope of this report.

3.4. OPERATION AND MAINTENANCE PHASE

51. The overall operation and maintenance strategy will be finalised once the operation and maintenance base location and technical specification of the Array are known (including wind turbine type, electrical export option, and final layout). Works carried out in the operation and maintenance phase will be conducted from either a Service Operations Vessel (SOV), helicopters, drones, or Crew Transfer Vessels (CTV) for routine operations and maintenance works, as well as heavy lift vessels and/or jack-up vessels for infrequent major maintenance campaigns. Remotely Operated Vehicles (ROVs) will be used to inspect anchors, anchor mooring systems, and cabling.

52. The operation and maintenance of the Array will be both preventative and corrective. The details of estimated annual and total operation and maintenance activities will be detailed within the Project Description chapter of the Array EIA Report.

3.5. DECOMMISSIONING PHASE

53. 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 of a marine license has been issued for the development. Developers are then required to submit a detailed plan for the decommissioning works, including anticipated costs and financial securities. This plan will consider good industry practice and guidance and legislation relating to decommissioning at that time. This plan will be consulted on by stakeholders and made publicly available. The Array EIA Report will provide an overview of the anticipated decommissioning events and an assessment of the potential significant effects of this phase on receptors.

4. IDENTIFICATION OF EUROPEAN SITES AND FEATURES

54. This section presents European sites (including Ramsar Sites), and their qualifying features, for which there is the potential for connectivity with the Array, using the criteria defined in Table 2.1, and therefore those which should be taken forward for consideration of LSE in section 5.

55. The following receptor groups are considered in turn:

- Annex I habitats (section 4.1);
- Annex II diadromous fish and shellfish features (section 4.2);
- Annex II marine mammal features (section 4.3); and
- Annex I marine ornithological features (section 4.4).

4.1. SITES DESIGNATED FOR ANNEX I HABITATS

4.1.1. INITIAL IDENTIFICATION FOR ANNEX I HABITATS (OFFSHORE, COASTAL, AND ONSHORE)

56. The following section details the results of the stepwise process undertaken to identify any European sites with relevant Annex I habitats (offshore, coastal, and onshore) to be taken forward for detailed determination of LSE based on the methodology and criteria outlined in section 2.3 and Table 2.1.

57. The approach adopted for this LSE Screening Report focusses on the Annex I habitat qualifying interest features for which there is a potential for impact as a result of the Array. Whilst pathways to individual features are identified, the consideration for the HRA is acknowledged to be for the integrity of the European site as a whole.

Criterion 1

58. There are no European sites with relevant qualifying Annex I habitats which overlap with the Array, therefore no sites are screened in for further consideration on the basis of this criterion.

Criterion 2

59. There are no European sites which meet criterion 2 for Annex I habitats (as Annex I habitats do not contain mobile features) and so no sites are screened in for further consideration on this basis.

Criterion 3

60. 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, operation and maintenance and decommissioning activities. Based on the Physical Processes section of the Array EIA Scoping Report, the extent of these impacts is considered to be insignificant and unlikely to extend beyond the Array to the surrounding area.

61. For this LSE Screening, one tidal excursion has been used to estimate the spatial extent of indirect effects such as increased SSC associated with the Array. While site-specific physical processes modelling has not yet been undertaken to allow for a site-specific tidal excursion to be determined, it is unlikely that this tidal excursion would extend beyond 20 km from the Array. For the purposes of LSE Screening, a precautionary approach has been adopted using a 20 km for indirect effects on Annex I habitats. This buffer is considered to be sufficiently precautionary to capture all sites likely to be within the ZoI from indirect effects associated with the Array.

62. There are no European sites which meet this criterion for Annex I habitats (the closest SAC with Annex I habitats is Berwickshire and North Northumberland Coast at 113.98 km away from the site boundary) and so no sites have been screened in for further consideration on this basis.

4.1.2. SUMMARY OF INITIAL SCREENING OF SITES FOR ANNEX I HABITATS (OFFSHORE AND COASTAL)

63. The initial screening process has identified no European sites with Annex I habitat features to be taken forward for determination of LSE in section 5 of this report.

4.2. SITES DESIGNATED FOR ANNEX II DIADROMOUS FISH AND SHELLFISH FEATURES

64. This section outlines the results of the stepwise process undertaken to identify the European sites with relevant Annex II diadromous fish species to be taken forward for the determination of LSE based on the methodology and criteria outlined in section 2.3 and Table 2.1.

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

66. Based on the review of key desktop sources undertaken during the Array EIA Scoping Report, the following Annex II diadromous fish and shellfish species are considered to have the potential to occur within the vicinity of the Array, and are considered in the LSE Screening:

- sea lamprey *Petromyzon marinus*;
- Atlantic salmon *Salmo salar*; and
- freshwater pearl mussel *Margaritifera margartitifera* (this species will not be directly affected as it is restricted to freshwater environments but has the potential to be indirectly impacted due to its symbiotic life cycle with Atlantic salmon).

67. River lamprey *Lampetra fluviatilis* is not considered within this LSE Screening as the marine phase of this species life cycle is restricted to the coastal/estuarine environment. Given the distance of the Array offshore (approximately 80 km from the nearest coastline), interactions between this species and activities associated with the Array are not anticipated.

4.2.1. INITIAL IDENTIFICATION OF SITES AND POTENTIAL CONNECTIVITY

Criterion 1

68. As there are no European sites with relevant Annex II diadromous fish species as qualifying features which overlap with the Array (Figure 4.3), no sites are screened in for further consideration for diadromous fish on the basis of this criterion.

Criterion 2

69. There is the potential for activities associated with the construction, operation and maintenance and decommissioning of the Array 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 highly mobile and are present in both freshwater and marine environments throughout their life cycles. A precautionary buffer of 100 km has been applied in in order to capture all sites with the potential for connectivity to the Array and, in particular, to consider the potential for disruption to migration (e.g. barriers to migration) of Annex II diadromous fish to/from natal rivers. In addition, all sites which flow into the Firth of Forth and the Moray Firth will also be included in order to consider the potential for disruption to migration of these species.

Atlantic salmon (and freshwater pearl mussel)

70. On this basis, all SACs for Atlantic salmon (and freshwater pearl mussel) located within the North East anadromous fish region boundary, shown in Figure 4.1, have been screened in. These SACs are illustrated in Figure 4.3. This is considered to be a precautionary approach, as recent evidence from Newton *et al.* (2017) and Marine Scotland Science (2019) suggests that Atlantic salmon smolts migrating from rivers in the Moray Firth head north and directly across the North Sea relatively rapidly, rather than moving in a coastal direction upon leaving their natal rivers. Similar evidence of a rapid easterly migration out into the North Sea has also been shown for the River Dee in Aberdeenshire (Marine Scotland Science, 2019) and the River Conon in Ross-shire (Newton *et al.*, 2021).

71. Similarly, for adult Atlantic salmon, while there is some evidence that adult Atlantic salmon may migrate along the east coast of Scotland, the latest evidence indicates that adult migration to natal rivers in the Moray Firth is most likely from the north (see Figure 4.2 from Malcolm *et al.*, 2010; see also ABPmer (2014) and The Crown Estate (2019) which suggest migration is primarily from the north). As such, the risk of the Array causing a barrier to adults migrating to and from SACs flowing into the Moray Firth is lower than SACs flowing into the Firth of Forth. There are no SACs designated for Atlantic salmon on the east coast of England, therefore no SACs have been identified south of the River Tweed SAC.

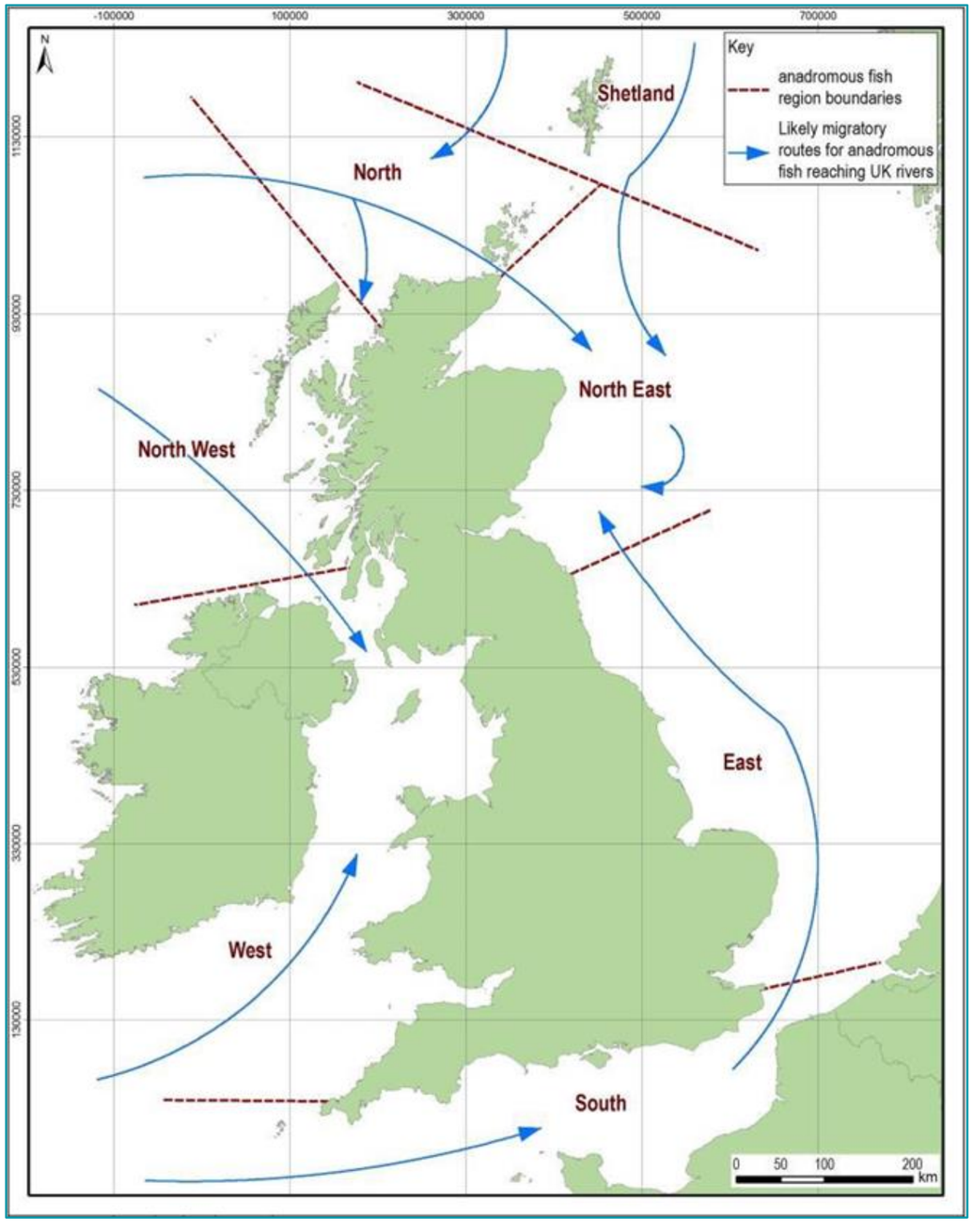


Figure 4.1: Location and Extent of Coastal Regions for Screening European Sites Designated for Annex II Diadromous Fish and Shellfish Qualifying Features (Source: ABPmer, 2014)

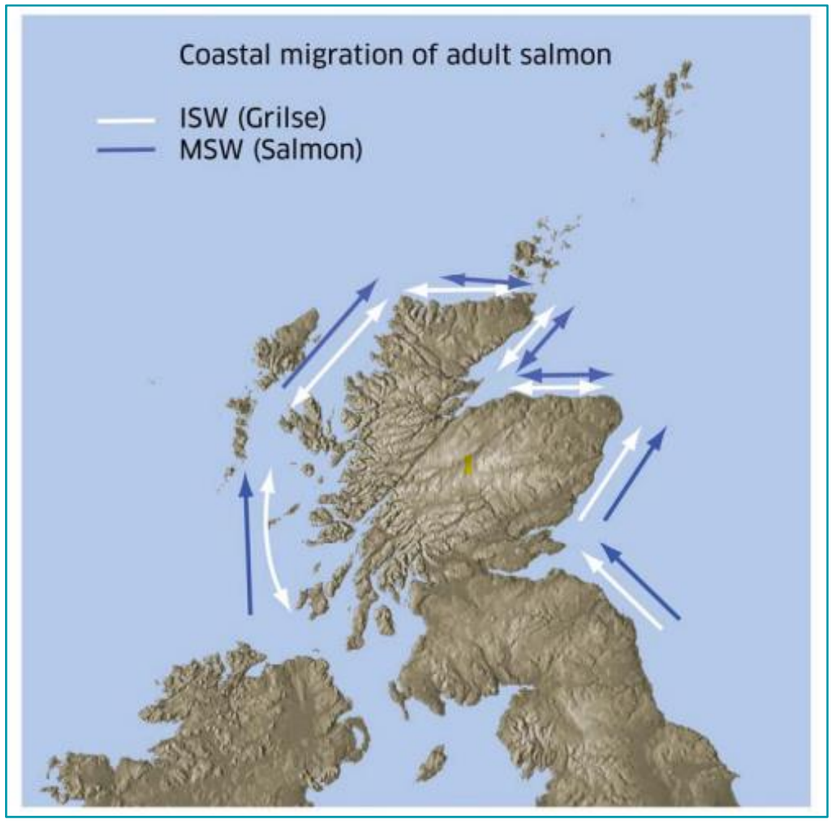


Figure 4.2: Dominant Directions of Travel for Atlantic Salmon (One Sea Winter (1SW) and Multi Sea Winter (MSW)) in Scottish Coastal Waters Based on Tagging Studies (Source: Malcolm *et al.*, 2010)

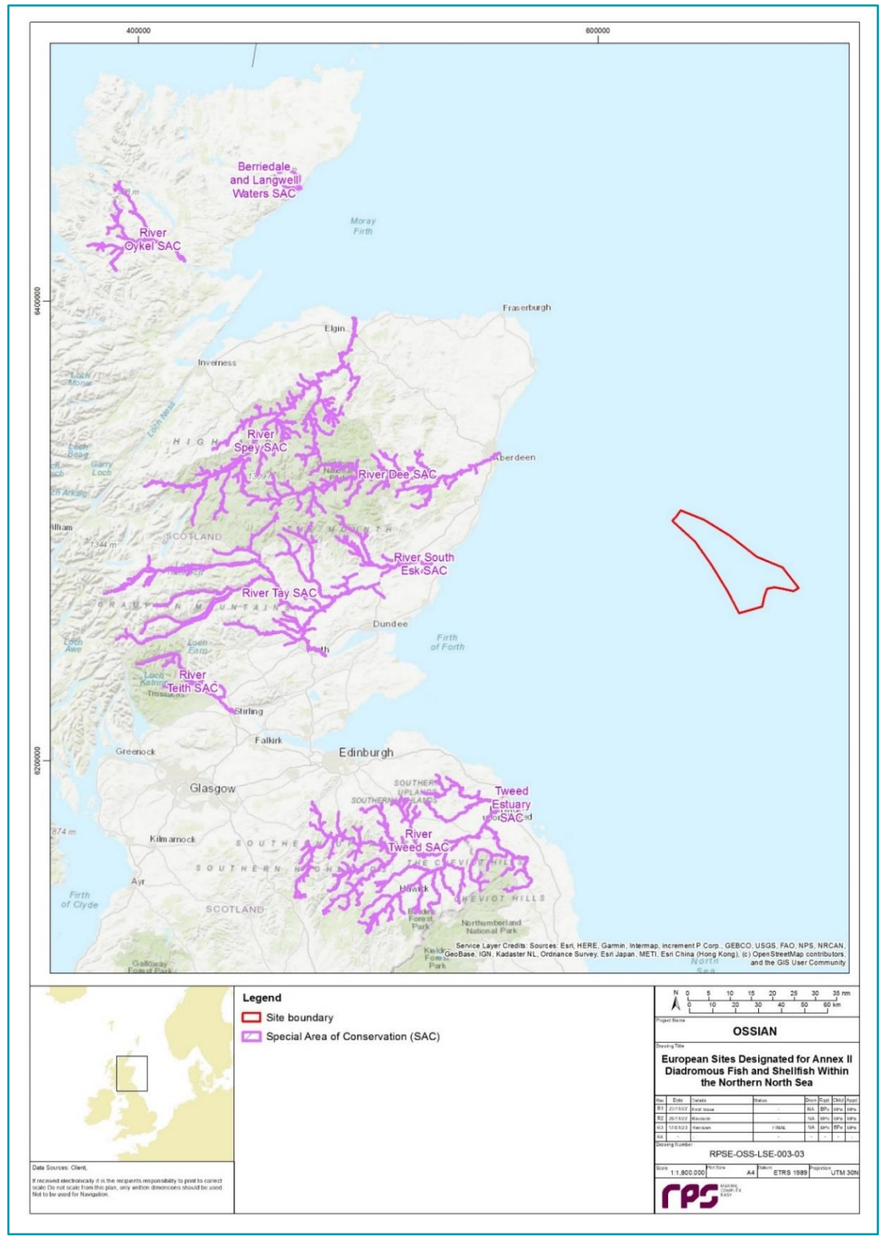


Figure 4.3: European Sites Designated for Annex II Diadromous Fish and Shellfish Species to be Considered in the LSE Screening

Sea lamprey

72. There is very limited information on the spatial distribution of sea lamprey species outside of the estuarine environment, therefore the area considered for Atlantic salmon, (which is conservative in itself) (paragraphs 70 and 71), is considered to be suitably precautionary to identify relevant European sites designated for sea lamprey.

73. On this basis, a total of nine European sites have been screened in using this criterion for diadromous fish (Figure 4.3 and Table 4.1) and will, therefore, be taken forward for determination of LSE in section 5.2. The sites are:

- River Dee SAC;
- River South Esk SAC;
- Tweed Estuary SAC;
- River Tweed SAC;
- River Tay SAC;
- River Spey SAC;
- Berriedale and Langwell Waters SAC;
- River Teith SAC; and
- River Oykel SAC.

Criterion 3

74. Given the large buffer proposed for criterion 2 in paragraph 69 *et seq.* (i.e. broadly using a 100 km buffer from the Array, but screening in all SAC rivers flowing into the Firth of Forth and the Moray Firth), the ZoI for key impacts to diadromous fish species (i.e. subsea noise, habitat loss and increased SSC) are anticipated to be well within this range. Therefore, no additional European sites or transboundary sites with Annex II diadromous fish as qualifying features, beyond those already identified for criterion 2, are 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 AND SHELLFISH FEATURES

75. The initial screening process has identified nine European sites with Annex II diadromous fish species (or related features) as qualifying features to be taken forward for detailed determination of LSE in section 5.2 of this report. The sites are listed in Table 4.1 and illustrated in Figure 4.3. The Natura 2000 standard data forms for all sites are provided in Appendix 1.

Table 4.1: European Sites Designated for Annex II Diadromous Fish and Shellfish Features

European Site	Site Code	Relevant Annex II Diadromous Fish and Freshwater Pearl Mussel* Features	Distance to Site Boundary (km)
River Dee SAC	UK0030251	Atlantic salmon Freshwater pearl mussel	80.57
River South Esk SAC	UK0030262	Atlantic salmon Freshwater pearl mussel	107.13
Tweed Estuary SAC	UK0030292	Sea lamprey	128.65
River Tweed SAC	UK0012691	Atlantic salmon Sea lamprey	133.40
River Tay SAC	UK0030312	Atlantic salmon Sea lamprey	162.32
River Spey SAC	UK0019811	Atlantic salmon Freshwater pearl mussel Sea lamprey	181.56
Berriedale and Langwell Waters SAC	UK0030088	Atlantic salmon	219.57
River Teith SAC	UK0030263	Atlantic salmon Sea lamprey	244.19
River Oykel SAC	UK0030261	Atlantic salmon Freshwater pearl mussel	259.33

*Atlantic salmon are host species during a critical parasitic phase of the freshwater pearl mussel lifecycle. Therefore, there could be an indirect effect upon the freshwater pearl mussel feature of sites it is a designating feature of, should the Atlantic salmon population be adversely affected.

4.3. SITES DESIGNATED FOR ANNEX II MARINE MAMMAL FEATURES

76. The site-specific aerial surveys for the Array were conducted monthly between March 2021 and February 2023. At the time of writing, preliminary counts from March 2021 to September 2022 were available and were used to inform the Array EIA Scoping Report. Once available, the full dataset will be analysed in full and included within the Array EIA Report. Based on the preliminary data collected and a review of key desktop sources undertaken during the Array EIA Scoping Report, the following Annex II marine mammal species are considered likely to occur in the vicinity of the Array, and are considered in the LSE Screening:

- harbour porpoise; and
- grey seal.

77. Bottlenose dolphin and harbour seal were not included in the Array EIA Scoping Report due to minimal sightings during the site-specific aerial surveys and weak evidence of connectivity of coastal populations with the Array. However, as consulted with stakeholders during the pre-Scoping workshop (Table 1.1), the approach to the LSE Screening for Annex II marine mammal features focussed on species MUs. As the MUs for bottlenose dolphin and harbour seal overlap with the regional marine mammal study area (Figure 4.4), European sites designated for these species will be considered as a precaution.

78. The Annex II European otter *Lutra lutra,* is not considered as it will not be present in offshore waters and the potential for impact as a result of offshore works is highly unlikely due to the distance between the Array and the coast (approximately 80 km). This species will be covered in separate HRA documentation for the onshore components (landward of MHWS) of the Array, if required.

4.3.1. INITIAL IDENTIFICATION OF SITES AND POTENTIAL CONNECTIVITY

79. The stepwise process used to identify European sites with relevant Annex II qualifying interest features to be carried forward for further assessment of LSE is detailed below. This is based on the methodology and criteria presented in section 2.3 and Table 2.1.

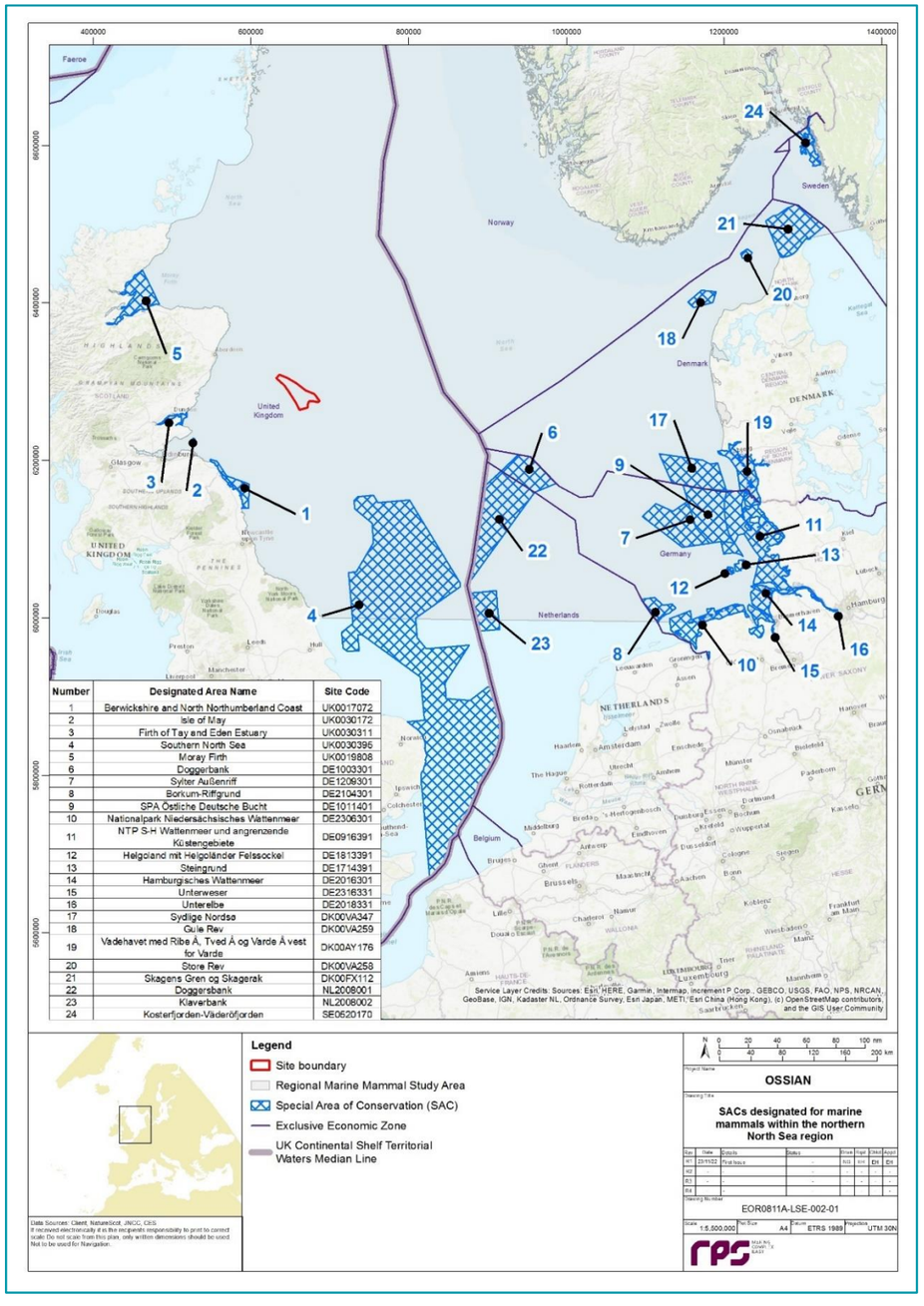
80. This LSE Screening Report focusses on individual Annex II marine mammal qualifying interest features with the potential to be impacted as a result of the Array that are screened in for further consideration of LSE (in section 5).

Criterion 1

81. The site boundary does not overlap with any European sites designated for Annex II marine mammal qualifying interest features (Figure 4.4), therefore no European sites are screened in for further consideration for Annex II marine mammals based on this criterion.

Criterion 2

82. Marine mammals are highly mobile species, which can forage over wide areas. Therefore, there is the potential for activities associated with the construction, operation and maintenance and decommissioning of the Array to result in impacts on Annex II marine mammal species at distance from the sites for which they are qualifying interest features. The following paragraphs present the relevant ranges for different marine mammal receptors.



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

Figure 4.4: European Sites Designated for Annex II Marine Mammals Within the Northern North Sea and Regional Marine Mammal Study Area

Cetaceans

83. The regional marine mammal study area, presented in the Array EIA Scoping Report, includes the northern North Sea and extends eastward to include the coastline and waters of Norway, Sweden, Germany, Denmark and The Netherlands, as illustrated in Figure 4.4. The regional marine mammal study area was informed by MUs for different marine mammal species in order to design an area that was representative of potential species-specific connectivity with the Array. The cetacean MUs are defined by the Inter Agency Marine Mammal Working Group (IAMMWG) (2015). The identification of relevant sites designated for Annex II cetaceans (i.e. harbour porpoise and bottlenose dolphin) was undertaken using a precautionary approach in order to capture all sites with potential connectivity to the Array under criterion 2. On this basis, it is considered that all sites with these species as qualifying interest features located within the regional marine mammal study area could potentially be affected and are therefore taken forward for determination of LSE.

84. All European sites designated for harbour porpoise or bottlenose dolphin as qualifying interest features that fall within the regional marine mammal study area have been considered. A total of 20 European sites designated for harbour porpoise, and a single site for bottlenose dolphin have been screened in using this criterion (Table 4.2 and Figure 4.4).

Grey seal

85. The MUs for both grey and harbour seal were defined by the Special Committee on Seal (SCOS) (2021). The Array is located within the East Scotland Seal MU, borders the Northeast England Seal MU, and is within the vicinity of the Moray Firth Seal MU. Thus, any European sites that are located within the same Seal MU as the Array (i.e. the East Scotland Seal MU) will be considered for screening at this stage. Furthermore, connectivity between the Array and the Northeast England Seal MU and the Moray Firth Seal MU has also been considered. During pre-Scoping consultation (see Table 1.1), NatureScot advised that a standard 50 km buffer should be used for harbour seal, but for grey seal NatureScot advised a buffer of 20 km for Scottish SACs should be applied. This reflects the fact that grey seals utilise east coast SACs during the breeding season during which time they will generally stay within 20 km of that site (advice received during the Scoping Workshop, Table 1.1). NatureScot consider this to be the key period relevant to this HRA. However, grey seal typical foraging ranges are up to 100 km from their haul out sites, with individuals recorded further than 100 km (SCOS, 2021). Telemetry data and sightings during the site-specific aerial surveys (Figure 5.1; Sinclair, 2021) show evidence of connectivity between the Array and the Isle of May SAC (located within the East Scotland Seal MU) and the Berwickshire and North Northumberland Coast SAC (located across the East Scotland Seal MU and the Northeast England Seal MU; Table 4.2 and Figure 4.4). Given the potential for seals from these SACs to interact with activities associated with the Array, on a precautionary basis, these sites have been taken forward for further consideration at LSE Screening.

Harbour seal

86. As above for grey seal, all European sites designated for harbour seal that are located within the same Seal MU as the Array (i.e. the East Scotland Seal MU) will be considered for screening. Connectivity between European sites in nearby Seal MUs will also be considered. In addition, a screening range has been applied to identify sites for inclusion in the assessment of LSE for harbour seal which is based on a combination of the typical foraging range of this species and telemetry data available from harbour seal tagged by the Sea Mammal Research Unit (SMRU) in the East Scotland Seal MU (Sinclair, 2021). Harbour seal tend to make relatively short foraging trips from haul out sites and typically forage at distances of 40 km to 50 km from haul out sites (SCOS, 2021). Site-specific aerial data and telemetry data from harbour seal tagged in the Firth of Tay and Eden Estuary SAC demonstrates that whilst harbour seal movements are mostly coastal with little overlap with the Array, there are some incidents of connectivity between the Array and the SAC (Figure 5.2; Sinclair, 2021). Therefore, in order to adopt a precautionary approach to the initial screening of sites for harbour seal, this SAC has been taken forward for LSE Screening. On this basis, one European site designated for harbour seal has been identified for further consideration at LSE Screening: The Firth of Tay and Eden Estuary SAC (Table 4.2 and Figure 4.4).

Criterion 3

87. Given the large distributions defined in Criterion 2 for cetaceans and pinnipeds, the ZoI of key impacts (such as elevated subsea noise and changes to prey availability) are considered likely to be well within this area. No further European sites with Annex II marine mammals as qualifying features have been screened in for further consideration under Criterion 3.

4.3.2. SUMMARY OF INITIAL SCREENING OF SITES FOR ANNEX II MARINE MAMMAL FEATURES

88. A total of 24 European sites with Annex II marine mammals as qualifying interest features have been identified in the initial screening process. These sites will be taken forward for a detailed determination of LSE (presented in section 5.3), and are presented in Table 4.2 and Figure 4.4. The Natura 2000 standard data forms for each site are presented in Appendix 1.

Table 4.2: European Sites Designated for Annex II Marine Mammal Features That Are to be Taken Forward for Determination of LSE

Number	European Site	Site Code	Relevant Annex II Marine Mammal Features	Distance to Site Boundary (km)
United Kingdom				
1	Berwickshire and North Northumberland Coast	UK0017072	Grey seal	113.95
2	Isle of May	UK0030172	Grey seal	129.50
3	Firth of Tay and Eden Estuary	UK0030311	Harbour seal	121.55
4	Southern North Sea	UK0030311	Harbour porpoise	129.86
5	Moray Firth	UK0019808	Bottlenose dolphin	175.86
Germany				
6	Doggerbank	DE1003301	Harbour porpoise	246.56
7	Sylter Außenriff	DE1209301	Harbour porpoise	434.50
8	Borkum-Riffgrund	DE2104301	Harbour porpoise	479.21
9	Östliche Deutsche Bucht	DE1011401	Harbour porpoise	473.23
10	Nationalpark Niedersächsisches Wattenmeer	DE2306301	Harbour porpoise	522.67
11	NTP S-H Wattenmeer und angrenzende Küstengebiete	DE0916391	Harbour porpoise	528.34
12	Helgoland mit Helgoländer Felssockel	DE1813391	Harbour porpoise	558.41
13	Steingrund	DE1714391	Harbour porpoise	565.23
14	Hamburgisches Wattenmeer	DE2016301	Harbour porpoise	595.41
15	Unterweser	DE2316331	Harbour porpoise	624.24
16	Unterelbe	DE2018331	Harbour porpoise	627.00
Denmark				
17	Sydlige Nordsø	DK00VA347	Harbour porpoise	436.07
18	Gule Rev	DK00VA259	Harbour porpoise	483.86
19	Vadehavet med Ribe Å, Tved Å og Varde Å vest for Varde	DK00AY176	Harbour porpoise	508.52
20	Store Rev	DK00VA258	Harbour porpoise	566.05
21	Skagens Gren og Skagerak	DK00FX112	Harbour porpoise	610.26
The Netherlands				
22	Doggersbank	NL2008001	Harbour porpoise	234.54
23	Klaverbank	NL2008002	Harbour porpoise	308.34
Sweden				
24	Kosterfjorden-Väderöfjorden	SE0520170	Harbour porpoise	687.08

4.4. SITE DESIGNATED FOR MARINE ORNITHOLOGICAL FEATURES

4.4.1. INITIAL IDENTIFICATION OF SITES AND POTENTIAL CONNECTIVITY

89. The approach used to identify European sites with relevant ornithological qualifying interest features to be carried forward for further assessment of LSE is detailed below. This is based on methodology and criteria presented in section 2.3 and Table 2.1. The assessment has taken into account advice provided by Marine Scotland Science (MSS) (2021), Nature Scot (2021), and Natural England (2021a, 2021b) during consultation on the Berwick Bank Wind Farm.

Criterion 1

90. As there are no European sites with relevant seabird species as qualifying features which overlap with the Array, no sites are screened in for further consideration for seabirds on the basis of this criterion.

Criterion 2

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

92. Based on the above, it is considered that the Special Protection Areas SPAs (and Ramsar sites) which have the potential to be affected by the Array are those which:

- include seabird qualifying features that use the waters in and around the Array (e.g. for foraging); and
- include qualifying features which may fly through the area of the Array during migration.

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

- breeding seabird colony SPAs (and Ramsar sites); and
- SPAs (and Ramsar sites) with migratory waterbird qualifying features (subsequently termed migratory waterbird SPAs for convenience, with waterbirds defined for this report as waders, ducks, geese, swans, grebes, divers, gulls, terns and cormorants).

94. No marine SPAs are located within sufficient proximity of the Array for connectivity to be likely, with the closest such site being the Outer Firth of Forth and St Andrews Bay Complex SPA which, at approximately 80 km from the Array, is beyond the distance at which potential effects are likely to extend (i.e. a 15 km buffer zone as agreed with NatureScot and MSS. This is particularly so, given that such SPAs provide supporting habitat for

qualifying features (for purposes such as foraging and moulting), as opposed to providing only the nesting or roosting areas, from which qualifying features commute to their foraging areas.

Breeding seabird colony SPAs (and Ramsar sites)

95. To determine the breeding seabird colony SPAs which may have connectivity with the Array, those SPAs on the east coast of Scotland and in north (including Orkney and Shetland) and north-west Scotland were considered in terms of the potential for connectivity during the breeding season. In addition, several SPAs on the east coast of England were also included for consideration, in line with advice from Natural England (2021a) to the nearby Berwick Bank Offshore Wind Farm. St Kilda was the most southerly SPA in north-west Scotland included when considering connectivity during the breeding season, on the basis that there are qualifying species within mean maximum foraging range (plus one standard deviation (+1 SD)). The qualifying features from more southerly sites on the west coast are highly unlikely to use the waters in proximity of the Array as they are beyond mean maximum foraging ranges (+1 SD during the breeding season (Woodward *et al*., 2019, Furness, 2015, Dean *et al*., 2012, 2015, Shoji *et al*., 2015). In terms of connectivity during the non-breeding periods, for the majority of species, consideration essentially extended to all UK breeding seabird colony SPAs (given the potential for birds to disperse more widely when not constrained by the location of their breeding sites), although for some it is assumed that the populations remain in the same regions as used during the breeding season. Further consideration of connectivity in the breeding and non-breeding seasons is provided below.

Connectivity in the breeding season

96. The initial stage of establishing potential connectivity during the breeding season involved determining whether the Array area is within either (i) the mean maximum foraging range and (ii) the mean maximum foraging range +1 SD of each qualifying feature from each of the SPAs (Table 4.3, Woodward *et al.* 2019). An alternative measure of distance is also included for breeding seabird SPAs that are within potential foraging ranges (as determined by the straight line distance) and where there is potential for larger land masses to result in the 'by-sea' distance being greater than the straight line distance (Table 4.4). The 'by-sea' distance represents the shortest distance using a route around, as opposed to across, land masses and is used on the basis that seabirds will generally avoid flying over larger land masses. The 'by-sea' distance is used to establish connectivity in any instances where this differs from the straight line distance between the Array and a SPA (e.g. SPAs located on the west coast of Scotland). For most SPAs on the east coast of mainland Scotland and England, the 'by-sea' and straight line distances to the Array are equivalent (Table 4.4)).

97. Taking the 'by-sea' distance into account increases the effective seabird flight distance for several SPAs, particularly for those in north-west Scotland, and means that there is no potential for breeding season connectivity with Priest Island SPA (because the 'by-sea flight distance greatly exceeds the estimated foraging range of Leach's storm-petrel *Oceanodroma leucorhoa*, which is the single qualifying feature at this SPA, Woodward *et al.,* 2019). Similarly, consideration of the 'by-sea' flight distance also excludes the potential for connectivity with Black-legged kittiwake *Rissa tridactyla* from Hoy SPA, Handa SPA and Cape Wrath SPA, with Atlantic puffin *Fratercula arctica* from Hoy SPA, and Northern gannet *Morus bassanus* from St Kilda (on the basis that the 'by-sea' flight distances between each of these SPAs and the Array will exceed the mean maximum foraging range + 1 SD of the relevant qualifying feature, Woodward *et al.,* 2019). Also, it is considered highly unlikely that Manx shearwater *Puffinus puffinus* from the St Kilda SPA would have connectivity with Array, given the foraging areas used by birds from other colonies of this species in western Britain and its known distribution in UK waters (Kober *et al.,* 2010, Dean *et al.,* 2012, 2015, Shoji *et al.,* 2015).

98. One full breeding season of data (i.e.for March to September 2021) from the two year aerial survey programme covering the offshore ornithology aerial survey study area has been processed to date(with details of the baseline survey results be outlined in the Scoping Report). These data demonstrate that several of the species which are identified as having potential breeding season connectivity with the Array in Table 4.4 occur infrequently and in low numbers within this survey area during the breeding season. Thus, there were no breeding season (as defined in NatureScot (2020)) records of lesser black-backed gull *Larus fuscus*, Roseate tern *Sterna dougallii*, storm petrel, cormorant *Phalacrocorax carbo*, European shag *Phalacrocorax aristotelis*, Sandwich tern *Thalasseus sandvicensis*, or Leach's storm petrel, and a total of five great skua *Stercorarius skua* recorded. Based on this low level of occurrence, there is considered to be little, or no, potential for breeding season connectivity for SPA populations of these species, except in the context of these species as qualifying features of migratory waterbird SPAs.

99. Given the above, it is considered that 29 of the breeding seabird colony SPAs identified in Table 4.4 have potential connectivity with the Array during the breeding season. It is considered that there is no potential for connectivity with the following SPAs:

100. Priest Island SPA because the 'by-sea flight distance greatly exceeds the estimated foraging range of storm petrel.

101. Ramna Stacks and Gruney SPA due to the absence of records of Leach's storm petrel (the only qualifying feature of this SPA) during the baseline surveys for the Array.

102. Ronas Hill – North Roe and Tingon SPA due to the scarcity of breeding season records of great skua during the baseline surveys for the Array (great skua being the only qualifying feature of this SPA within mean maximum foraging range + 1 SD of the Array).

103. Auskerry SPA due to the absence of breeding season records of storm petrel during the baseline surveys for the Array (storm petrel being the only qualifying feature of this SPA within likely foraging range of the Array).

104. In addition, the absence and scarcity of records of the species listed above means that there is considered to be no connectivity in the breeding season with the populations of these species from other SPAs (for which there may be other species which have breeding season connectivity). For example, the absence of records of lesser black-backed gull from the first breeding season's survey data suggests that the populations of this species from the Forth Islands SPA and Coquet Island SPA have no breeding season connectivity with the Array, despite it being within the species' estimated mean maximum foraging range + 1 SD from these SPAs (Table 4.3).

Table 4.3: Mean Maximum Foraging Ranges of Breeding Seabirds (from Woodward *et al.,* 2019)

Species	Mean maximum foraging range (km) ± 1 standard deviation (SD)
Red-throated diver *Gavia stellata*	9.0*
Leach's storm-petrel	657.0**
European storm-petrel *Hydrobates pelagicus*	336.0*
Northern fulmar *Fulmarus glacialis*	542.3 ± 657.9
Manx shearwater	1346.0 ± 1018.7
Northern gannet	315.2 ± 194.2
European shag *Phalacrocorax aristotelis*	13.2 ± 10.5
Cormorant	25.6 ± 8.3
Black-legged kittiwake *Rissa tridactyla*	156.1 ± 144.5
Black-headed gull *Chroicocephalus ridibundus*	18.5*
Common gull *Larus canus*	50.0*
Great black-backed gull *Larus marinus*	73.0*
Herring gull *Larus argentatus*	58.8 ± 26.8
Lesser black-backed gull	127.0 ± 109
Sandwich tern	34.3 ± 23.2
Little tern *Sternula albifrons*	5.0*
Arctic tern *Sterna paradisaea*	25.7 ± 14.8
Common tern *Sterna hirundo*	17.6 ± 9.1
Roseate tern	12.6 ± 10.6

Species	Mean maximum foraging range (km) ± 1 standard deviation (SD)
Great skua	443.3 ± 487.9
Arctic skua *Stercorarius parasiticus*	2 ± 0.7***
Razorbill *Alca torda*	88.7 ± 75.9
Common guillemot *Uria aalge*	73.2 ± 80.5
Black guillemot *Cepphus grylle*	4.8 ± 4.3
Atlantic puffin	137.1 ± 128.3

Notes:

*No SD available for mean maximum value.

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

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

Table 4.4: European Sites Designated for Marine Ornithological Features with Potential Connectivity to the Array

ID	European Site	Site Code	Straight Line Distance to Array (km)[1]	'By-Sea' Distance to Array (km)[2]	Relevant Qualifying Features[3]	Within Mean Maximum Foraging Range[4, 5]	Within Mean Maximum Foraging Range +1SD[4, 5]
Breeding Seabird Colonies							
1	Fowlsheugh SPA	UK9002271	81.3	N/A	• seabird assemblage (breeding) including the components: – fulmar – guillemot – herring gull – kittiwake – razorbill	 Y N N Y Y	 Y Y Y Y Y
2	Buchan Ness to Collieston Coast SPA	UK9002491	82.7	N/A	• seabird assemblage (breeding) including the components: – kittiwake – herring gull – guillemot – shag – fulmar	 Y N N N Y	 Y Y Y N Y
3	Farne Islands SPA	UK9006021	120.9	N/A	• Arctic tern (breeding) • common tern (breeding) • Roseate tern (breeding) • guillemot (breeding) • seabird assemblage (breeding) including the components: – kittiwake – shag – cormorant – puffin	N N N N Y N N Y	N N N Y Y N N Y
4	St Abb's Head to Fast Castle SPA	UK9004271	125.5	N/A	• guillemot (breeding) • herring gull (breeding) • razorbill (breeding) • kittiwake (breeding)	N N N Y	Y N Y Y
5	Forth Islands SPA	UK9004171	126.3	N/A	• Arctic tern (breeding) • common tern (breeding) • Roseate tern (breeding) • Sandwich tern (breeding) • gannet (breeding) • shag (breeding) • lesser black-backed gull (breeding) • puffin (breeding) • seabird assemblage (breeding) including the components: – guillemot – razorbill – kittiwake – herring gull – cormorant	N N N N Y N Y Y N N Y N N	N N N N Y N Y Y Y Y Y N N
6	Troup, Pennan and Lion's Heads SPA	UK9002471	120.6	132	• kittiwake (breeding) • guillemot (breeding) • seabird assemblage (breeding) including the components:	Y N	Y Y

ID	European Site	Site Code	Straight Line Distance to Array (km)[1]	'By-Sea' Distance to Array (km)[2]	Relevant Qualifying Features[3]	Within Mean Maximum Foraging Range[4, 5]	Within Mean Maximum Foraging Range +1SD[4, 5]
					– fulmar	Y	Y
					– herring gull	N	N
					– razorbill	N	Y
7	Coquet Island SPA	UK9006031	147.6	N/A	• Arctic tern (breeding)	N	N
					• common tern (breeding)	N	N
					• Roseate tern (breeding)	N	N
					• Sandwich tern (breeding)	N	N
					• seabird assemblage (breeding) including the components:		
					– puffin	N	Y
					– black-headed gull	N	N
					– fulmar	Y	Y
					– herring gull	N	N
					– lesser black-backed gull	N	Y
					– kittiwake	Y	Y
8	East Caithness Cliffs SPA	UK9001182	211.8	N/A	• guillemot (breeding)	N	N
					• razorbill (breeding)	N	N
					• herring gull (breeding)	N	N
					• kittiwake (breeding)	N	Y
					• shag (breeding)	N	N
					• seabird assemblage (breeding) including the components:		
					– great black-backed gull	N	N
					– cormorant	N	N
					– fulmar	Y	Y
9	Copinsay SPA	UK9002151	245.4	N/A	• seabird assemblage (breeding) including the components:		
					– guillemot	N	N
					– kittiwake	N	Y
					– great black-backed gull	N	N
					– fulmar	Y	Y
10	Flamborough and Filey Coast SPA	UK9006101	248.5	N/A	• gannet (breeding)	Y	Y
					• kittiwake (breeding)	N	Y
					• guillemot (breeding)	N	N
					• razorbill (breeding)	N	N
					• seabird assemblage (breeding) including the components:		
					– fulmar	Y	Y
					– puffin	N	Y
					– herring gull	N	N
					– shag	N	N
					– cormorant	N	N
11	Auskerry SPA	UK9002381	258	N/A	• storm petrel (breeding)	Y	Y
					• Arctic tern (breeding)	N	N
12	Rousay SPA	UK9002371	282.7	286	• Arctic tern (breeding)	N	N
					• seabird assemblage (breeding) including the components:		
					– Arctic skua	N	N
					– kittiwake	N	Y
					– guillemot	N	N
					– fulmar	Y	Y

ID	European Site	Site Code	Straight Line Distance to Array (km)[1]	'By-Sea' Distance to Array (km)[2]	Relevant Qualifying Features[3]	Within Mean Maximum Foraging Range[4, 5]	Within Mean Maximum Foraging Range +1SD[4, 5]
13	Marwick Head SPA	UK9002121	287.3	N/A	• guillemot (breeding) • seabird assemblage (breeding) including the components: - kittiwake	N N	N Y
14	Fair Isle SPA	UK9002091	291.5	N/A	• Arctic tern (breeding) • guillemot (breeding) • seabird assemblage (breeding) including the components: – puffin – razorbill – kittiwake – great skua – Arctic skua – shag – gannet – fulmar	N N N N N Y N N N Y	N N N N Y Y N N Y Y
15	West Westray SPA	UK9002101	293	295	• Arctic tern (breeding) • guillemot (breeding) • seabird assemblage (breeding) including the components: – razorbill – kittiwake – Arctic skua – fulmar	N N N N N Y	N N N Y N Y
16	Calf of Eday SPA	UK9002431	280.9	316	• seabird assemblage (breeding) including the components: – cormorant – great black-backed gull – guillemot – fulmar – kittiwake	 N N N Y N	 N N N Y N
17	Sumburgh Head SPA	UK9002511	327.3	N/A	• Arctic tern (breeding) • seabird assemblage (breeding) including the components: – guillemot – kittiwake – fulmar	N N N Y	N N N Y
18	North Caithness Cliffs SPA	UK9001181	229.1	332	• guillemot (breeding) • seabird assemblage (breeding) including the components: – fulmar – kittiwake – razorbill – puffin	N Y N N N	N Y Y N N
19	Noss SPA	UK9002081	357.5	N/A	• gannet (breeding) • great skua (breeding) • guillemot (breeding) • seabird assemblage (breeding) including the components: – fulmar – kittiwake – puffin	N Y N Y N N	Y Y N Y N N
20	Hoy SPA	UK9002141	253.8	360	• red-throated diver (breeding)	N	N

ID	European Site	Site Code	Straight Line Distance to Array (km)[1]	'By-Sea' Distance to Array (km)[2]	Relevant Qualifying Features[3]	Within Mean Maximum Foraging Range[4, 5]	Within Mean Maximum Foraging Range +1SD[4, 5]
					• great skua (breeding) • seabird assemblage (breeding) including the components: – puffin – kittiwake – Arctic skua – fulmar – great black-backed gull – guillemot	Y N N N Y N N	Y N N N Y N N
21	Foula SPA	UK9002061	362.1	N/A	• Arctic tern (breeding) • Leach's storm petrel (breeding) • red-throated diver (breeding) • great skua (breeding) • guillemot (breeding) • puffin (breeding) • shag (breeding) • seabird assemblage (breeding) including the components: – kittiwake – razorbill – Arctic skua – fulmar	N Y N Y N N N N N N Y	N Y N Y N N N N N N Y
22	North Rona and Sula Sgeir SPA	UK9001011	383.4	N/A	• gannet (breeding) • fulmar (breeding) • seabird assemblage (breeding) including the components: – great black-backed gull – kittiwake – razorbill – puffin	N Y N N N N	Y Y N N N N
23	Fetlar SPA	UK9002031	405.3	N/A	• Arctic tern (breeding) • great skua (breeding) • seabird assemblage (breeding) including the components: – Arctic skua – fulmar	N Y N Y	N Y N Y
24	Ronas Hill – North Roe and Tingon SPA	UK9002041	403.3	423	• red-throated diver (breeding) • great skua (breeding) • seabird assemblage (breeding) including the components: – Arctic skua – black guillemot	N Y N N	N Y N N
25	Sule Skerry and Sule Stack SPA	UK9002181	320.4	433	• Storm petrel (breeding) • Leach's storm petrel (breeding) • gannet (breeding) • puffin (breeding) • seabird assemblage (breeding) including the components: – guillemot – shag	N Y N N N N	N Y Y N N N
26	Ramna Stacks and Gruney SPA	UK9002021	418.4	438	– Leach's storm petrel (breeding)	Y	Y

ID	European Site	Site Code	Straight Line Distance to Array (km)[1]	'By-Sea' Distance to Array (km)[2]	Relevant Qualifying Features[3]	Within Mean Maximum Foraging Range[4, 5]	Within Mean Maximum Foraging Range +1SD[4, 5]
27	Hermaness, Saxa Vord and Valla Field SPA	UK9002011	424.9	438	• red-throated diver (breeding) • gannet (breeding) • great skua (breeding) • puffin (breeding) • seabird assemblage (breeding) including the components: – fulmar – shag – guillemot – kittiwake	N N Y N Y N N N	N Y Y N Y N N N
28	Cape Wrath SPA	UK9001231	303.9	463	• seabird assemblage (breeding) including the components: – kittiwake – guillemot – razorbill – puffin – fulmar	 N N N N Y	 N N N N Y
29	Handa SPA	UK9001241	306.9	521	• guillemot • razorbill • seabird assemblage (breeding) including the components: – great skua – kittiwake – fulmar	N N N N Y	N N Y N Y
30	Priest Island SPA	UK9001261	305.6	553	• storm petrel (breeding)	N	N
31	Shiant Isles SPA	UK9002091	346.6	582	• shag (breeding) • razorbill (breeding) • puffin (breeding) • seabird assemblage (breeding) including the components: – fulmar – guillemot – kittiwake	N N N Y N N	N N N Y N N
32	Flannan Isles SPA	UK9001021	429.3	612	• Leach's storm petrel (breeding) • seabird assemblage (breeding) including the components: – guillemot – razorbill – puffin – fulmar – kittiwake	Y N N N N N	Y N N N Y N
33	St Kilda SPA	UK9001031	468.4	669	• Storm petrel (breeding) • Leach's storm petrel (breeding) • gannet (breeding) • great skua (breeding) • puffin (breeding) • seabird assemblage (breeding) including the components: – guillemot – razorbill – kittiwake	N N N N N N N N	N N N Y N N N N

ID	European Site	Site Code	Straight Line Distance to Array (km)[1]	'By-Sea' Distance to Array (km)[2]	Relevant Qualifying Features[3]	Within Mean Maximum Foraging Range[4, 5]	Within Mean Maximum Foraging Range +1SD[4, 5]
					– Manx shearwater – fulmar	Y N	Y Y
Migratory Waterbirds Sites (Estuarine)							
34	Ythan Estuary, Sands of Forvie and Meikle Loch SPA, Ythan Estuary and Meikle Loch Ramsar site	UK9002221 UK13061	81.2	N/A	• pink-footed goose *Anser brachyrhynchus* (non-breeding) • waterfowl assemblage (non-breeding) including the components: – eider *Somateria mollissima* – lapwing *Vanellus vanellus* – redshank *Tringa totanus*	N/A	N/A
35	Montrose Basin SPA and Ramsar site	UK9004031 UK13046	101.7	N/A	• greylag goose *Anser anser* (non-breeding) • pink-footed goose (non-breeding) • redshank (non-breeding) • waterfowl assemblage (non-breeding) including the components: – oystercatcher *Haematopus ostralegus* – eider – wigeon *Anas penelope* – knot *Calidris canutus* – dunlin *Calidris alpina* – shelduck *Tadorna tadorna*	N/A	N/A
36	Firth of Tay and Eden Estuary SPA and Ramsar site	UK9004121 UK13018	122.6	N/A	• bar-tailed godwit *Limosa lapponica* (non-breeding) • greylag goose *Anser anser* (non-breeding) • pink-footed goose (non-breeding) • redshank (non-breeding) • waterfowl assemblage (non-breeding) including the components: – velvet scoter *Melanitta fusca* – cormorant – shelduck – eider – common scoter *Melanitta nigra* – Icelandic black-tailed godwit *Limosa limosa islandica* – goldeneye *Bucephala clangula* – red-breasted merganser *Mergus serrator* – goosander *Mergus merganser* – oystercatcher – grey plover *Pluvialis squatarola* – sanderling *Calidris alba* – dunlin – long-tailed duck *Clangula hyemalis*	N/A	N/A
37	Lindisfarne SPA and Ramsar site	UK9006011 UK11036	125.9	N/A	• bar-tailed godwit (non-breeding) • common scoter (non-breeding) • dunlin (non-breeding) • eider (non-breeding) • golden plover *Pluvialis apricaria* (non-breeding) • grey plover (non-breeding) • greylag goose (non-breeding) • light-bellied brent goose *Branta bernicla hrota* (non-breeding) • long-tailed duck (non-breeding)	N/A	N/A

ID	European Site	Site Code	Straight Line Distance to Array (km)[1]	'By-Sea' Distance to Array (km)[2]	Relevant Qualifying Features[3]	Within Mean Maximum Foraging Range[4, 5]	Within Mean Maximum Foraging Range +1SD[4, 5]
					• red-breasted merganser (non-breeding) • redshank (non-breeding) • ringed plover *Charadrius hiaticula* (non-breeding) • sanderling *Calidris alba* (non-breeding) • shelduck (non-breeding) • whooper swan *Cygnus cygnus* (non-breeding) • wigeon (non-breeding) • waterbird assemblage (non-breeding)		
38	Firth of Forth SPA and Ramsar site	UK9004411 UK13017	126	N/A	• bar-tailed godwit *Limosa lapponica* (non-breeding) • golden plover *Pluvialis apricaria* (non-breeding) • knot *Calidris canutus* (non-breeding) • pink-footed goose *Anser brachyrhynchus* (non-breeding) • red-throated diver (non-breeding) • redshank *Tringa totanus* (non-breeding) • Sandwich tern (passage) • shelduck *Tadorna tadorna* (non-breeding) • Slavonian grebe *Podiceps auritus* (non-breeding) • turnstone *Arenaria interpres* (non-breeding) • waterfowl assemblage (non-breeding) including the components: – scaup *Aythya marila* – great crested grebe *Podiceps cristatus* – cormorant – curlew *Numenius arquata* – eider – long-tailed duck – common scoter – velvet scoter – goldeneye – red-breasted merganser – oystercatcher – ringed plover – grey plover – dunlin – mallard *Anas platyrhynchos* – lapwing *Vanellus vanellus* – wigeon	N/A	N/A
39	Northumbria Coast SPA and Ramsar site	UK9006131 UK11048	128	N/A	• purple sandpiper *Calidris maritima* (non-breeding) • turnstone *Arenaria interpres* (non-breeding)	N/A	N/A
Migratory Waterbird Sites (Inland Waterbodies)							
40	Loch of Kinnordy SPA and Ramsar site	UK9004051 UK13038	136	N/A	• greylag goose (non-breeding) • pink-footed goose (non-breeding)	N/A	N/A
41	Holburn Lake and Moss SPA and Ramsar site	UK9006041 UK11030	136.2	N/A	• greylag goose (non-breeding)	N/A	N/A

ID	European Site	Site Code	Straight Line Distance to Array (km)[1]	'By-Sea' Distance to Array (km)[2]	Relevant Qualifying Features[3]	Within Mean Maximum Foraging Range[4, 5]	Within Mean Maximum Foraging Range +1SD[4, 5]
43	Cameron Reservoir SPA and Ramsar site	UK9004131 UK13005	139.1	N/A	• pink-footed goose (non-breeding)		
43	Greenlaw Moor SPA and Ramsar site	UK9004281 UK13022	153.1	N/A	• pink-footed goose (non-breeding)	N/A	N/A
44	Din Moss - Hoselaw Loch SPA and Ramsar site	UK9004291 UK13010	157.1	N/A	• greylag goose (non-breeding) • pink-footed goose (non-breeding)	N/A	N/A
45	Loch Leven SPA and Ramsar site	UK9004111 UK13033	171.1	N/A	• whooper swan *Cygnus cygnus* (non-breeding) • pink-footed goose (non-breeding) • shoveler *Anas clypeata* (non-breeding) • waterfowl assemblage (non-breeding) including the components: – cormorant – gadwall *Anas strepera* – teal *Anas crecca* – pochard *Aythya ferina* – tufted duck *Aythya fuligula* – goldeneye	N/A	N/A
46	Fala Flow SPA and Ramsar site	UK9004241 UK13015	172.3	N/A	• pink-footed goose (non-breeding)	N/A	N/A
47	South Tayside Goose Roosts SPA and Ramsar site	UK9004401 UK13057	176.2	N/A	• greylag goose (non-breeding) • pink-footed goose (non-breeding) • wigeon (non-breeding) • waterfowl assemblage (non-breeding)	N/A	N/A
48	Gladhouse Reservoir SPA and Ramsar site	UK9004231 UK13021	185.3	N/A	• pink-footed goose (non-breeding)	N/A	N/A
49	Westwater SPA and Ramsar site	UK9004251 UK13060	201.5	N/A	• pink-footed goose (non-breeding) • waterfowl assemblage (non-breeding)	N/A	N/A
50	Slamannan Plateau SPA	UK9004441	215.2	N/A	• taiga bean goose *Anser fabalis fabalis* (non-breeding)	N/A	N/A

Notes:

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

2. Measured as the closest distance when avoiding large land masses. *Where the 'by-sea' distance is further than the straight-line distance this has been used for calculating whether the features of the SPA are within mean maximum foraging range (with/without 1 SD)

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

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

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

Connectivity in the non-breeding season

105. Outside the breeding season seabirds are not constrained by the requirement to attend nests and may disperse over greater distances than during the breeding season. As such, there is potential for connectivity with a greater range of qualifying features from breeding seabird colony SPAs than during the breeding season. In the scoping advice provided to the Berwick Bank Offshore Wind Farm, MSS (2021) and NatureScot (2021) advised that consideration of the potential for non-breeding season effects associated with the Array should be based upon the Biologically Defined Minimum Population Scales (BDMPS) approach (Furness, 2015) for all species other than guillemot and puffin, whilst advice provided subsequent to scoping indicated that this should also be the case for herring gull (Royal HaskoningDHV, 2021). Therefore, consistent with the recent advice provided to the Berwick Bank Offshore Wind Farm, for guillemot and herring gull, the breeding season foraging range is also be used for the non-breeding season because these species are not considered to disperse as widely from the breeding areas as are other seabird species during the non-breeding season (so that connectivity with the Array during the non-breeding period is as determined for the breeding season). For puffin, it is considered that no assessment is required for the non-breeding season, as concluded in the scoping advice provided to the Berwick Bank Offshore Wind Farm.

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

107. Processed and analysed data from the aerial survey programme are currently available for the period March 2021 to March 2022 (inclusive) and so encompass at least one full non-breeding period for seabird species (noting that definitions of the non-breeding period vary between species – NatureScot, 2020). The available survey data include no records of red-throated diver, lesser black-backed gull, Roseate tern, Sandwich tern, little tern, Arctic skua, great skua, storm petrel, Leach's storm petrel, shag, or cormorant from within the offshore ornithology aerial survey study area during the respective non-breeding periods of these species. On the basis of these low levels of occurrence within the offshore ornithology aerial survey study area, it is considered that connectivity with any SPA populations of these species during the non-breeding season is highly unlikely (except in the context of these species as qualifying features of migratory waterbird SPAs – Table 4.5). Also, none of the UK Manx shearwater SPA populations are considered to contribute to the UK North Sea BDMPS for this species (Furness, 2015), so there is no potential for connectivity with SPA populations of this species during the non-breeding period.

108. The above considerations indicate that the potential for connectivity between breeding seabird colony SPAs and the Array during the non-breeding season can be excluded in relation to several of the seabird species which are qualifying features of these SPAs. The remaining species of relevance are fulmar, great black-backed gull, kittiwake, gannet, and razorbill. These include the species recorded in greatest abundance on the offshore ornithology aerial survey study area during the baseline aerial surveys (as based upon the available processed data). For these five species it is assumed that there is the potential for non-breeding season connectivity for any of the SPA populations for which breeding season connectivity is established (as determined from the species' mean maximum foraging range + 1 SD - see Table 4.4 and associated text above). The potential for connectivity with other SPA populations of these species during the non-breeding season is determined on the basis of the contribution of these SPA populations to the relevant BDMPS population (Table 4.5) and total number of adult birds in the BDMPS population (Table 4.6).

Table 4.5: The Percentage Contribution of Different SPA Populations to the BDMPS Population Relevant to the Array (Based on Adult Birds Only), as Derived from Furness (2015)[1]

SPA	Percentage Contribution to the BDMPS Population (%)[2]				
	Fulmar	Great black-backed gull	Kittiwake	Gannet	Razorbill
Troup, Pennan and Lion's Heads SPA	-	N/A	-	N/A	-
East Caithness Cliffs SPA	-	1.09	-	N/A	8.27
Flamborough and Filey Coast SPA	-	N/A	-	-	6.62
North Caithness Cliffs SPA	-	N/A	-	N/A	1.07
Hoy SPA	-	0.37	-	N/A	N/A
Copinsay SPA		1.36			
Handa SPA	-	N/A	0.01	N/A	0.97
Cape Wrath SPA	-	N/A	0.05	N/A	0.39
Marwick Head SPA	N/A	N/A	-	N/A	N/A
Shiant Isles SPA	-	N/A	0.00	N/A	0.08
Rousay SPA	-	N/A	-	N/A	N/A
Calf of Eday SPA	-	1.75	0.24	N/A	N/A
West Westray SPA	-	N/A	-	N/A	0.35
Sule Skerry and Sule Stack SPA	-	N/A	N/A	-	N/A
Fair Isle SPA	-	N/A	-	-	0.57
North Rona and Sula Sgeir SPA	-	0.01	0.01	-	0.21
Sumburgh Head SPA	-	N/A	0.07	N/A	N/A
Flannan Isles SPA	-	N/A	0.01	N/A	0.02
Foula SPA	-	N/A	0.10	N/A	0.24
Noss SPA	-	N/A	0.16	-	N/A
St Kilda SPA	-	N/A	0.01	4.23	0.32
Ronas Hill – North Roe and Tingon SPA	N/A	N/A	N/A	N/A	N/A
Fetlar SPA	-	N/A	N/A	N/A	N/A
Hermaness, Saxa Vord and Valla Field SPA	-	N/A	0.12	-	N/A
Canna and Sanday	N/A	N/A	0.00	N/A	N/A
Rum	N/A	N/A	0.00	N/A	N/A
Mingulay and Berneray	0.09	N/A	0.01	N/A	1.90
North Colonsay	N/A	N/A	0.03	N/A	N/A
Ailsa Craig	N/A	N/A	0.00	0.00	N/A
Rathlin Island	0.01	N/A	0.04	N/A	1.45
Skomer, Skokholm and Seas off Pembrokshire	N/A	N/A	0.01	N/A	0.57
Grassholm	N/A	N/A	N/A	0.00	N/A
Isles of Scilly SPA		0.06			

Notes:

1. SPA populations are included for those species with potential connectivity to the Array during the non-breeding season but for which the SPA population does not have breeding season connectivity (see text). For species with multiple non-breeding periods (e.g., spring and autumn passage), the maximum percentage contribution to the BDMPS population is presented.

2. 'N/A' indicates that the species is not a qualifying feature of the SPA. '–' indicates that the SPA population has breeding season connectivity with the Array (so that non-breeding season connectivity is assumed – see paragraph 105).

Table 4.6: The Total Number of Different SPA Populations in the BDMPS Population Relevant to the Array (Based on Adult Birds Only), as Derived from Furness (2015)

	Fulmar	Great black-backed gull	Kittiwake	Gannet	Razorbill
Numbers of adult birds in BDMPS population[1]	408,808 – 573,641	32,070	375,815 – 480,815	163,701 – 284,747	106,183 – 302,314
Numbers of all birds (adults and immatures) in BDMPS population[1]	568,736 - 957,502	91,399	627,816 – 829,937	248,385 – 534,632	218,622 – 591,874

1. A range is given for species with multiple non-breeding periods, encompassing the minimum and maximum BDMPS population size.

109. The data in Table 4.5 and Table 4.6 demonstrate that these other SPA populations generally comprise a small part of the overall BDMPS population of the species (with SPA populations (adult birds only) being substantially below 1% of the wider BDMPS population in the vast majority of cases, even when this percentage contribution is calculated in relation to the adult component of the BDMPS population (as in Table 4.5) as opposed to entire BDMPS population). Given the assumption of even mixing of birds from different populations (and age classes), it is unlikely that there will be any substantive degree of connectivity between most of these SPA populations and the Array during the non-breeding season because of the low likelihood that the birds using the Array will derive from these populations. Therefore, for the SPA populations of these five species which do not have breeding season connectivity, it is considered that the potential for connectivity is limited to those SPA populations which comprise 1% or more of the adult component of the relevant BDMPS population. On this basis, potential connectivity in the non-breeding season only is limited to the following SPA populations:

- great black-backed gull: East Caithness Cliffs SPA, Copinsay SPA and Calf of Eday SPA;
- gannet: St Kilda SPA; and
- razorbill: East Caithness Cliffs SPA, Flamborough and Filey Coast SPA, North Caithness Cliffs SPA, Mingulay and Berneray SPA and Rathlin Island SPA.

Migratory waterbird SPAs (and Ramsar sites)

110. To identify European sites designated for migratory waterbirds which have potential connectivity with the Array, consideration has been given to the likely migratory pathways and distribution of coastal estuarine sites and inland waterbody roost sites for the associated species. The search area for initial screening has been focussed on the estuarine and inland waterbody SPAs and Ramsar sites within the Eastern Lowlands and Border Hills Natural Heritage Zones (NHZs) (Figure 4.1). The Slamannan Plateau SPA (in the West Central Belt NHZ) and the Ythan Estuary, Sands of Forvie and Meikle Loch SPA/Ythan Estuary and Meikle Loch Ramsar site (in the North East Coastal Plain NHZ) are also included because of the potential for the waterbird qualifying features from these sites to use migratory pathways within the vicinity of the Array. Additionally, the Northumbria Coast SPA (and Ramsar site), Lindisfarne SPA (and Ramsar site) and Holburn Lake and Moss SPA (and Ramsar site) are included following advice from Natural England (2021a) regarding the adjacent development of Berwick Bank Offshore Wind Farm.

111. A total of 17 SPAs for migratory waterbirds are considered to have the potential for connectivity with the Array and are taken forward for determination of LSE (Table 4.4). Within Table 4.4, these SPAs are subdivided according to whether they are estuarine or inland sites.

4.4.2. SUMMARY OF INITIAL SCREENING OF SITES FOR ANNEX I MARINE ORNITHOLOGICAL FEATURES

112. As detailed above, the initial screening process identifies 46 European sites with seabirds or migratory waterbirds as qualifying features to be taken forward for detailed determination of LSE in section 5.4 of this report. These sites are identified, together with their distance to the Array and the qualifying features of relevance, in Table 4.7 below (noting that the further details outlined in the section 4.4 mean that four of the 33 breeding seabird colony SPAs identified in Table 4.4 are excluded from further consideration). The locations of these sites are shown in Figure 4.1. Table 4.4 identifies the full list of qualifying features for all but six of the 46 SPAs (and Ramsar sites) which are taken forward for determination of LSE.

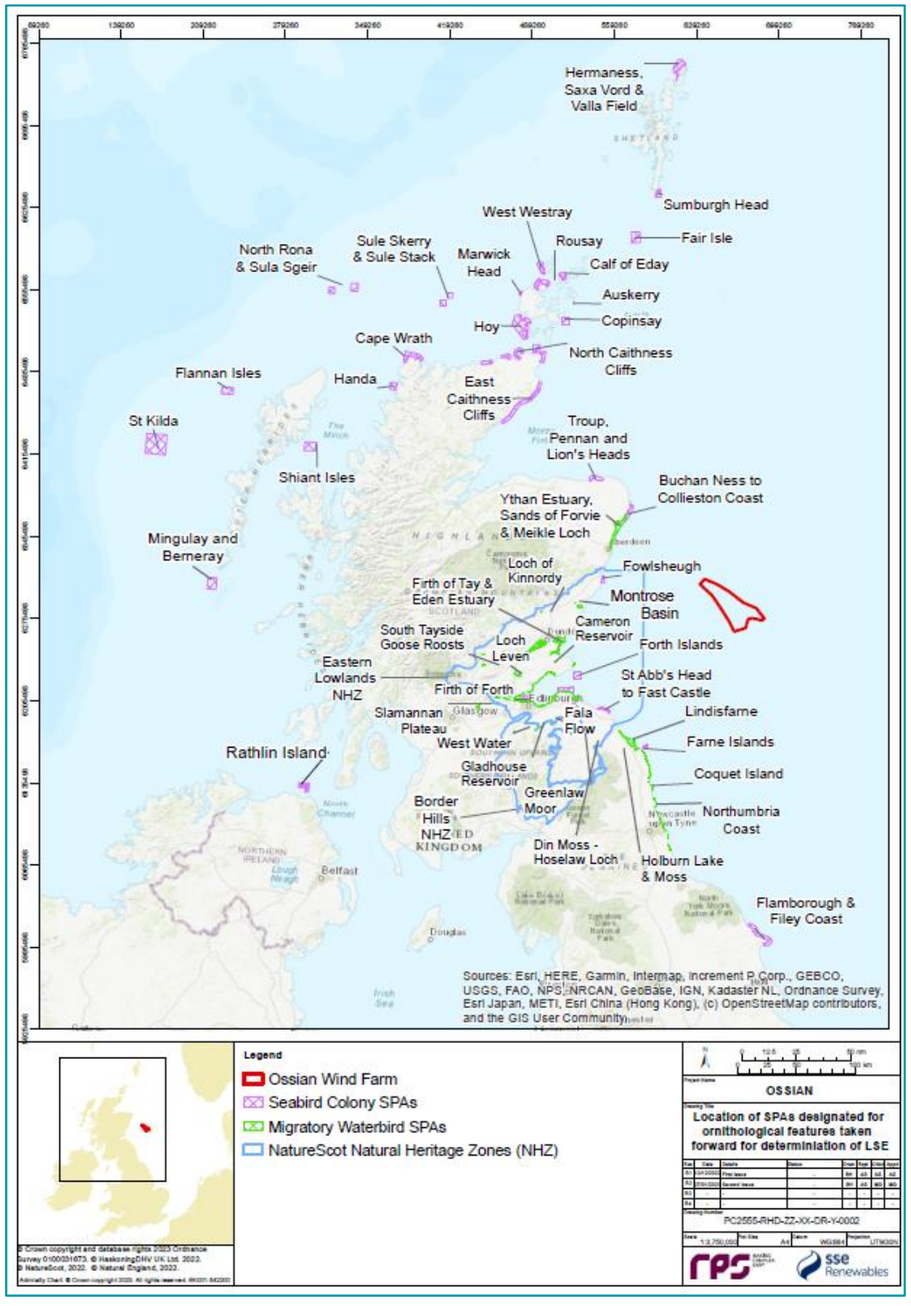


Figure 4.5: Location of European Sites Designated for Ornithological Features (Seabirds and Migratory Waterbirds) Taken Forward for Determination of LSE

Table 4.7: The SPAs and Ramsar Sites Taken Forward for Determination of LSE, with Details of the Associated Qualifying Features

European Site	Relevant Qualifying Features[1]
Breeding Seabird Colony SPAs	
Fowlsheugh SPA	• seabird assemblage (breeding) including the components: – fulmar – guillemot – herring gull – kittiwake – razorbill
Buchan Ness to Collieston Coast SPA	• seabird assemblage (breeding) including the components: – kittiwake – herring gull – guillemot – fulmar
Farne Islands SPA	• guillemot (breeding) • seabird assemblage (breeding) including the components: – kittiwake – puffin[2]
St Abb's Head to Fast Castle SPA	• seabird assemblage (breeding) including the components: - guillemot (breeding) - razorbill (breeding) - kittiwake (breeding)
Forth Islands SPA	• gannet (breeding) • puffin (breeding)[2] • seabird assemblage (breeding) including the components: – guillemot – razorbill – kittiwake
Troup, Pennan and Lion's Heads SPA	• kittiwake (breeding) • guillemot (breeding) • seabird assemblage (breeding) including the components: – fulmar – razorbill
Coquet Island SPA	• seabird assemblage (breeding) including the components: – puffin[2] – fulmar – kittiwake
East Caithness Cliffs SPA	• razorbill (breeding)[3] • kittiwake (breeding) • seabird assemblage (breeding) including the components: – fulmar – great black-backed gull[3]
Copinsay SPA	• seabird assemblage (breeding) including the components: – kittiwake – fulmar – great black-backed gull[3]

European Site	Relevant Qualifying Features[1]
Flamborough and Filey Coast SPA	• gannet (breeding) • kittiwake (breeding) • razorbill (breeding)[3] • seabird assemblage (breeding) including the components: – fulmar – puffin[2]
Rousay SPA	• seabird assemblage (breeding) including the components: – fulmar – kittiwake
Marwick Head SPA	• seabird assemblage (breeding) including the components: - kittiwake
Fair Isle SPA	• seabird assemblage (breeding) including the components: – gannet – fulmar – kittiwake
West Westray SPA	• seabird assemblage (breeding) including the components: – kittiwake – fulmar
Calf of Eday SPA	• seabird assemblage (breeding) including the components: – fulmar – kittiwake – great black-backed gull[3]
Sumburgh Head SPA	• seabird assemblage (breeding) including the components: - fulmar
North Caithness Cliffs SPA	• seabird assemblage (breeding)) including the components: – fulmar – kittiwake – razorbill[3]
Noss SPA	• gannet (breeding) • seabird assemblage (breeding) including the components: – fulmar
Hoy SPA	• seabird assemblage (breeding) including the components: – kittiwake – fulmar
Foula SPA	• seabird assemblage (breeding) including the components: – fulmar
North Rona and Sula Sgeir SPA	• gannet (breeding) • fulmar (breeding)
Fetlar SPA	• seabird assemblage (breeding) including the components: - fulmar
Sule Skerry and Sule Stack SPA	• gannet (breeding)
Hermaness, Saxa Vord and Valla Field SPA	• gannet (breeding) • seabird assemblage (breeding) including the components: - fulmar
Cape Wrath SPA	• seabird assemblage (breeding) including the components: – fulmar
Handa SPA	• seabird assemblage (breeding) including the components: – fulmar
Shiant Isles SPA	• seabird assemblage (breeding) including the components: – fulmar
Flannan Isles SPA	• seabird assemblage (breeding) including the components: - fulmar
St Kilda SPA	• gannet (breeding)[3] • seabird assemblage (breeding) including the components: - fulmar
Mingulay and Berneray SPA	• razorbill (breeding)[3] • seabird assemblage (breeding)
Rathlin Island SPA	• razorbill (breeding)[3] • seabird assemblage (breeding)
Migratory Waterbird Sites (Estuarine)	
Ythan Estuary, Sands of Forvie and Meikle Loch SPA, Ythan Estuary and Meikle Loch Ramsar site	• pink-footed goose (non-breeding) • waterfowl assemblage (non-breeding) including the components: – eider – lapwing – redshank
Montrose Basin SPA and Ramsar site	• greylag goose (non-breeding) • pink-footed goose (non-breeding) • redshank (non-breeding) • waterfowl assemblage (non-breeding) including the components: – oystercatcher – eider – wigeon – knot – dunlin – shelduck
Firth of Tay and Eden Estuary SPA and Ramsar site	• bar-tailed godwit (non-breeding) • greylag goose (non-breeding) • pink-footed goose (non-breeding) • redshank (non-breeding) • waterfowl assemblage (non-breeding) including the components: – velvet scoter – cormorant – shelduck – eider – common scoter – Icelandic black-tailed godwit – goldeneye – red-breasted merganser – goosander – oystercatcher – grey plover – sanderling – dunlin – long-tailed duck

European Site	Relevant Qualifying Features[1]
Lindisfarne SPA and Ramsar site	• bar-tailed godwit (non-breeding) • common scoter (non-breeding) • dunlin (non-breeding) • eider (non-breeding) • golden plover (non-breeding) • grey plover (non-breeding) • greylag goose (non-breeding) • light-bellied brent goose (non-breeding) • long-tailed duck (non-breeding) • red-breasted merganser (non-breeding) • redshank (non-breeding) • ringed plover (non-breeding) • sanderling (non-breeding) • shelduck (non-breeding) • whooper swan (non-breeding) • wigeon (non-breeding) • waterbird assemblage (non-breeding)
Firth of Forth SPA and Ramsar site	• bar-tailed godwit (non-breeding) • golden plover (non-breeding) • knot (non-breeding) • pink-footed goose (non-breeding) • red-throated diver (non-breeding) • redshank (non-breeding) • Sandwich tern (passage) • shelduck (non-breeding) • Slavonian grebe (non-breeding) • turnstone (non-breeding) • waterfowl assemblage (non-breeding) including the components: – scaup – great crested grebe – cormorant – curlew – eider – long-tailed duck – common scoter – velvet scoter – goldeneye – red-breasted merganser – oystercatcher – ringed plover – grey plover – dunlin – mallard – lapwing – wigeon
Northumbria Coast SPA and Ramsar site	• purple sandpiper (non-breeding) • turnstone (non-breeding)

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

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

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

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

5. DETERMINATION OF LIKELY SIGNIFICANT EFFECT

113. Section 4 identified a list of European sites and qualifying interest features to be assessed for LSE as a result of activities associated with the Array (see Table 4.1, Table 4.2 and Table 4.7). This section identifies the LSEs for the sites identified in section 4 and provides justification.

5.1. METHODOLOGY

114. The assessment of LSE in the following sections is presented as a series of matrices setting out whether LSE can be excluded for the relevant features of the European sites identified for each receptor in section 4.

115. The matrix approach adopted is based upon an approach set out within the Planning Inspectorate's Advice Note 10 on HRA (The Planning Inspectorate, 2022; Version 9) which relates 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 Array 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.

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

- ✓ = Potential for a LSE;
- ✗ = No potential for a LSE;
- C = Construction phase;
- O&M = Operation and Maintenance phase; and
- D = Decommissioning phase.

117. With respect to the consideration of mitigation measures 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*."

118. Nature Scot interprets the judgement to mean that it is those measures specifically intended to avoid or reduce harmful effects to a European site which cannot be considered at the LSE Screening stage[4] Commensurate with Case C323/17 (and the interpretation by NatureScot), measures intended to avoid or reduce harmful effects on a European site specifically have not been considered when determining the potential for LSE. Measures intended specifically to protect European sites are however, considered distinct from those which may incidentally protect European sites to a degree, but which are intrinsic parts of the Array. For example, offshore wind farms typically require post-consent plans which cover the construction and operation phases and includes planning for accidental spills and biosecurity measures to limit the potential spread of Invasive Non-Native Species (INNS) (e.g. an Environmental Management Plan (EMP) and an INNS Management Plan (INNSMP), irrespective of the possible effects on European sites. On the advice of NatureScot and the Scottish Ministers, the Applicant has determined not to exclude such 'incidental' measures from the Array when undertaking Screening for LSE.

5.2. ASSESSMENT OF LSE FOR ANNEX II DIADROMOUS FISH AND SHELLFISH FEATURES

119. A total of nine European sites designated for Annex II diadromous fish and shellfish features were identified in the initial screening process (section 4.2) to be taken forward for determination of LSE. These sites are listed in full in Table 4.1, and include the following:

- River Dee SAC;
- River South Esk SAC;
- Tweed Estuary SAC;
- River Tweed SAC;
- River Tay;
- River Spey SAC;
- Berriedale and Langwell Waters SAC;
- River Teith SAC; and
- River Oykel SAC.

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

120. This section provides a list of potential impacts and effects on Annex II diadromous fish that may result from activities associated with the Array. 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.

121. The list of potential impacts has been compiled using the experience and knowledge gained from previous offshore wind farm projects within Scotland, the pressures data available on Scotland's environment web[5] for individual features of sites, NatureScot's 'guidance for plan-making bodies in Scotland' (NatureScot, 2015), and Natural England's 'advice on operations' (such as Natural England, 2020a and 2020b). The list of potential impacts has also been informed by the fish and shellfish ecology chapter of the EIA Scoping Report. 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 5.2.2.

Construction phase

Temporary habitat loss/disturbance

122. There is potential for temporary direct habitat loss and disturbance during construction operations (e.g. cable laying and seabed preparation). This impact, however, is restricted to within the footprint of the Array and as illustrated in Figure 4.3, there is no spatial overlap between the Array and any European sites designated for Annex II diadromous fish species. On this basis, there is no potential for direct impacts to supporting habitats for Annex II diadromous fish species within any European site.

123. There is potential for Annex II diadromous fish to be present in the waters in and around the Array and therefore be affected by temporary habitat loss/disturbance (e.g. effects on feeding grounds) during migrations to and from natal rivers. However, considering the highly mobile nature of Annex II diadromous fish features and the small spatial extent of supporting habitats affected with the similar available habitats present across the wider North Sea, significant impacts on foraging and food availability are not predicted. Therefore there would be no barrier effects to diadromous fish reaching the designated sites as a result of this impact.

124. On this basis, there is no potential for LSE on any Annex II diadromous fish qualifying interest features of European sites as a result of temporary habitat loss/disturbance during the construction phase, and this impact is screened out from further consideration for all European sites.

[4] SNH Guidance Note -The handling of mitigation in Habitats Regulations Appraisal – the People Over Wind CJEU judgement

[5] (https://www.environment.gov.scot/)

Increase in SSC and associated sediment deposition

125. Sediment disturbance arising from construction activities (e.g. seabed preparation works and cable laying) will result in temporary, indirect impacts on diadromous fish as a result of temporary increases in SSCs. As presented in the Array EIA Scoping Report, increases in SSC and associated sediment deposition are scoped out in the Physical Processes section and for Fish and Shellfish Ecology(therefore including the Annex II species presented in this report). This is because the spatial extent of any increases in SSC will be restricted to within the boundary of the Array and the surrounding area (i.e. within a few km of the site boundary), and will be intermittent and reversible. For the purposes of this LSE Screening, a precautionary ZoI of 20 km from the Array has been used for indirect effects from increases in SSC. The closest European site is the River Dee SAC which is located approximately 80 km from the Array. As there are no European sites within this ZoI there is no potential for direct impacts to supporting habitats for Annex II diadromous fish species within any European site.

126. There is potential for Annex II diadromous fish to be present in the waters in and around the Array and to be affected by increased SSC and associated sediment deposition (e.g. effects on feeding and feeding grounds) during migration to and from their natal rivers. Similar habitats are however widespread within this part of the North Sea and given the distance of the Array offshore and the highly mobile nature of diadromous fish, it is anticipated that they will be able to avoid areas of temporary increases in SSC and seek alternative foraging grounds in the vicinity. There is also potential for increases in SSC to result in disruption or barriers to migration to and from natal rivers, however due to the distance between the site boundary and the coast and the relatively limited zone of influence of increases in SSC, the risk of disruption to migration is predicted to be low and barrier effects will not occur.

127. On this basis, there is no potential for LSE on any Annex II diadromous fish qualifying interest features of European sites as a result of increases in SSC and associated sediment deposition during the construction phase, and this impact is screened out from further consideration for all European sites.

Subsea noise

128. Construction activities, including pile driving activities and UXO clearance, have the greatest potential for disturbance, auditory injury and/or mortality to diadromous fish species. The closest European site with Annex II diadromous fish qualifying interest features is the River Dee SAC, which is located 80.57 km from the Array, however there is potential for diadromous species to be present within or transiting through the Array area and potential area of impact. The ZoI will be determined for the EIA through subsea 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 subsea noise arising from construction activities cannot be excluded.

129. On this basis, there is potential for LSE on Annex II diadromous fish qualifying interest features of European sites as a result of subsea noise during the construction phase, and this impact is screened in for further consideration for all European sites.

Accidental pollution

130. There is a risk of pollution being accidentally released from vessels and equipment involved during the construction phase of the Array. Pollution events are considered unlikely, and given the volumes associated with offshore wind farm developments, should an event occur, effects will be temporary, reversible and limited in spatial extent (e.g. due to the expected low volumes of pollutants associated with offshore wind developments). Furthermore, considering the large distances to the SACs identified, (the nearest site being the River Dee SAC which is located approximately 80 km from the Array) any effects should they occur, will not directly affect the SACs. As noted above, any indirect effects on Annex II diadromous fish qualifying interests from accidental release of pollutants would be unlikely and should they occur these would be unlikely to lead to a significant effect on conservation objectives of the site (e.g. disruption of migration to/from SACs).

131. In addition, the risk of pollution events will be managed by the implementation of measures set out in standard post consent plans (e.g. an EMP, including a Marine Pollution Contingency Plan (MPCP), and an appropriate Code of Construction Practice (CoCP)) which will be implemented as part of the Array, notwithstanding potential pathways to European sites. These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. They will adhere to good industry practice and guidelines produced by OSPAR, The International Maritime Organisation (IMO) and The International Convention for the Prevention of Pollution from Ships (MARPOL). Whilst these measures are not required to exclude LSE on Annex II diadromous fish features, these will nonetheless reduce both the likelihood of pollution events occurring and the severity of such events should they occur.

132. On this basis, there is no potential for LSE on any Annex II diadromous fish qualifying interest features of European sites as a result accidental pollution during the construction phase, and this impact is screened out from further consideration for all European sites.

Operation and maintenance phase

Temporary habitat loss/disturbance

133. There is potential for temporary habitat loss/disturbance during maintenance operations, such as remedial cable burial operations. In addition, temporary habitat loss/disturbance may also occur due to movement of foundation moorings or cables on the seabed during the operation and maintenance phase. This impact will be spatially restricted to within the footprint of the Array and as illustrated in Figure 4.3, there is no spatial overlap between the Array and any European sites considered. On this basis, there is no potential for direct impacts to supporting habitats for Annex II diadromous fish species within any European site.

134. There is potential for Annex II diadromous fish to be present in the waters in and around the Array, and to be affected by temporary habitat loss/disturbance (e.g. effects on feeding grounds). Similar habitats are however widespread within this part of the North Sea and these Annex II species are highly mobile in nature . Furthermore, any impacts to supporting habitats such as foraging grounds outside the designated sites would be temporary and would not be expected to result in any long term effects on the availability of food in the area.

135. On this basis, there is no potential for LSE on any Annex II diadromous fish qualifying interest features of European sites as a result of temporary habitat loss/disturbance, and this impact is screened out from further consideration for all European sites.

Long term habitat loss

136. The presence of structures, such as OSP foundations, will result in the long term loss of seabed habitat or change from one seabed habitat to another (e.g. soft sediments to hard substrates) directly under the structures installed on the seabed. This impact will be restricted to within the footprint of the Array and as illustrated in Figure 4.3, there is no spatial overlap between the Array and any European sites considered. On this basis, there is no potential for direct impacts to supporting habitats for Annex II diadromous fish species within any European site.

137. There is however the potential for Annex II diadromous fish to be present in the waters in and around the Array, and to be affected by long term habitat loss (e.g. loss of feeding grounds). Similar habitats are however widespread within this part of the North Sea and the areas of seabed impacted by long term loss will be discreet and small in the context of the habitats present in the wider area, particularly considering the highly mobile nature of the Annex II species. Furthermore, no barrier effects to diadromous fish reaching the designated sites as a result of this impact are expected. Any impacts to supporting habitats such as foraging grounds outside the designated sites would be localised and would not be expected to result in any long term effects on the availability of food in the area.

138. On this basis, there is no potential for LSE on any Annex II diadromous fish qualifying interest features of European sites as a result of long term habitat loss, and this impact is screened out from further consideration for all European sites.

Increase in SSC and associated sediment deposition

139. Operation and maintenance activities, such as inter-array cable maintenance works, may result in temporary increases in SSC and associated sediment deposition. Any increases in SSC will however be of substantially lower magnitude than those outlined for the construction phase and will be intermittent in nature (i.e. when the need for a cable repair or replacement arises). The spatial extent of any increases in SSC will be restricted to within the boundary of the Array and within a few km of the site boundary. For the purposes of this LSE Screening, a precautionary ZoI of 20 km from the Array has been used for indirect effects from increases in SSC The closest European site is the River Dee SAC which is located approximately 80 km from the Array. As there are no European sites within this ZoI, there is no potential for direct impacts to supporting habitats for Annex II diadromous fish species within any European site.

140. There is however the potential for Annex II diadromous fish to be present in the waters in and around the Array and to be affected by increased SSC and associated sediment deposition (e.g. effects on feeding and feeding grounds). Similar habitats are however widespread within this part of the North Sea and given the highly mobile nature of diadromous fish it is anticipated that they will be able to avoid areas of temporary increases in SSC and seek alternative foraging grounds in the vicinity. Any effects, should they occur would be temporary and intermittent and would not be expected to result in any long term effects on the availability of food in the area. There is also potential for increases in SSC to result in disruption or barriers to migration to and from natal rivers, however due to the distance between the site boundary and the coast and the relatively limited zone of influence of increases in SSC, the risk of disruption to migration is predicted to be low and barrier effects will not occur.

141. On this basis, there is no potential for LSE on any Annex II diadromous fish qualifying interest features of European sites as a result of increases in SSC and associated sediment deposition during the operation and maintenance phase, and this impact is screened out from further consideration for all European sites

Subsea noise

142. During the operation and maintenance phase there is the potential for subsea noise resulting from operational wind turbines and the presence of operation and maintenance vessels, to result in disturbance to Annex II diadromous fish as they pass through the Array area during migration to and from their natal rivers.

143. Subsea noise associated with the operation and maintenance phase is however substantially lower than for the construction phase. Operational wind turbines emit very low frequency and low sound pressure level noise that is likely to be within the natural range in variation for baseline noise (Norro *et al.*, 2011; Andersson *et al.*, 2011). Studies have found that sound levels are only high enough to have the potential to cause a behavioural reaction within metres from a wind turbine (Sigray and Andersson 2011; Andersson *et al*., 2011) and therefore such levels are not anticipated to result in significant effects (e.g. disruption of migration including barrier effects) on diadromous fish species. Similarly, subsea noise generated from operation and maintenance vessels is likely to be at a low level and effects would only occur if fish remain within the immediate vicinity of the vessel (i.e. within metres) for a number of hours which is unlikely given the likely movements that the majority of vessels (e.g. crew transfer vessels etc.) will be making within the Array.

144. On this basis, there is no potential for LSE on any Annex II diadromous fish qualifying interest features of European sites as a result of subsea noise during the operation and maintenance phase, and this impact is screened out of further consideration for all European sites.

Electromagnetic Fields (EMFs)

145. The presence of subsea electrical cabling (including dynamic cabling) has the potential to emit a localised EMF which may interfere with the navigation of diadromous fish (Gill and Bartlett, 2010). Without further, more detailed, assessment, the potential for LSE on Annex II features of European sites as a result of EMF from subsea cabling cannot be ruled out.

146. Therefore, on this basis, there is potential for LSE on Annex II diadromous fish qualifying interest features of European sites as a result of EMF during the operation and maintenance phase, and this impact is screened in for further consideration for all European sites.

Colonisation of hard structures

147. Artificial structures placed on the seabed (e.g. anchor mooring systems for floating turbines and fixed foundations for OSPs) in the offshore environment are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity and potential changes in prey/predator interactions.

148. These structures may also facilitate the spread of INNS. Further, the introduction of hard substrate into the marine environment could increase the time fish spend in the vicinity of the structures (known as the fish aggregation (or reef) effect). It is anticipated that the risk of bio-invasion and the spread of marine INNS is low. The environmental risk associated with INNS is considered to be relative to the capacity for a new species to enter a new environment and spread. The greatest risk exists where new opportunities are provided for novel invasive species. Although new infrastructure is being introduced to the seabed as a result of the Array, due to the presence of other offshore wind farms within the surrounding North Sea region there is not considered to be a new route to impact introduced by the Array. The hard substrates introduced as part of the Array would not result in the creation of new connectivity routes or "stepping-stones" that were previously absent. As there is already a potential for marine INNS to occur due to the presence of other local offshore wind farms within the North Sea, it is considered that there is no additional risk posed by the Array. Further, effects on diadromous fish are expected to be highly limited, given offshore areas coinciding with the Array are unlikely to be particularly important for diadromous fish species.

149. On this basis, there is no potential for LSE on any Annex II diadromous fish qualifying interest features of European sites as a result of the colonisation of hard structures, and this impact is screened out from further consideration.

Accidental pollution

150. The potential for LSE on Annex II diadromous features of the European sites as a result of accidental pollution during the operations and maintenance phase is considered to be consistent with that of the construction phase and can therefore be ruled out in line with the justification presented in paragraph 130.

151. On this basis, there is no potential for LSE on any Annex II diadromous fish qualifying interest features of European sites as a result of accidental pollution, and this impact is screened out from further consideration.

Decommissioning phase

152. The potential for impacts during the decommissioning phase will be considerably lower than those outlined above for the construction phase of the Array (see paragraphs 122 to 132), therefore these impacts are not repeated here.

5.2.2. DETERMINATION OF LSE FOR ANNEX II DIADROMOUS FISH SPECIES AND FRESHWATER PEARL MUSSEL

153. The results of the LSE determination assessments are presented in Table 5.1. The footnotes provided beneath the LSE matrices outline a brief justification to support the conclusions made with regard to LSE for each impact pathway and the qualifying features of the SAC considered.

LSE in-combination

154. The LSE test requires consideration of the Array alone and/or in-combination with other plans and projects. Therefore, it is not necessary at the LSE stage to consider sites/features for which an LSE ‘alone’ has already been identified, as in-combination effects will be considered at the Appropriate Assessment stage. The focus

at this stage should be to identify sites/features for which no LSE alone was concluded, but there is potential for a LSE in-combination with other plans and projects (e.g. due to wide foraging ranges resulting in a species interacting with a large number of projects).

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

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

Table 5.1: LSE Matrix for Annex II Fish and Freshwater Pearl Mussel Features of the Six SACs Identified (C = Construction, O = Operation and Maintenance, D = Decommissioning, ✓ = Potential for LSE, × = No Potential for LSE)

Site and Qualifying Feature of Site	Temporary Habitat Loss/Disturbance			Increases in SSC and Associated Sediment Deposition			Subsea noise			Long Term Habitat Loss			EMF			Colonisation of Hard Structures			Accidental Pollution			In-Combination Effects		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
River Dee SAC																								
Atlantic salmon	×a	×a	×a	×b	×b	×b	✓c	×c	×c		×d			✓e			×f		×g	×g	×g	✓h	✓h	×h
Freshwater pearl mussel	×a	×a	×a	×b	×b	×b	✓c	×c	×c		×d			✓e			×f		×g	×g	×g	✓h	✓h	×h
River South Esk SAC																								
Atlantic salmon	×a	×a	×a	×b	×b	×b	✓c	×c	×c		×d			✓e			×f		×g	×g	×g	✓h	✓h	×h
Freshwater pearl mussel	×a	×a	×a	×b	×b	×b	✓c	×c	×c		×d			✓e			×f		×g	×g	×g	✓h	✓h	×h
Tweed Estuary SAC																								
Sea lamprey	×a	×a	×a	×b	×b	×b	✓c	×c	×c		×d			✓e			×f		×g	×g	×g	✓h	✓h	×h
River Tweed SAC																								
Atlantic salmon	×a	×a	×a	×b	×b	×b	✓c	×c	×c		×d			✓e			×f		×g	×g	×g	✓h	✓h	×h
Sea lamprey	×a	×a	×a	×b	×b	×b	✓c	×c	×c		×d			✓e			×f		×g	×g	×g	✓h	✓h	×h
River Tay SAC																								
Atlantic salmon	×a	×a	×a	×b	×b	×b	✓c	×c	×c		×d			✓e			×f		×g	×g	×g	✓h	✓h	×h
Sea lamprey	×a	×a	×a	×b	×b	×b	✓c	×c	×c		×d			✓e			×f		×g	×g	×g	✓h	✓h	×h
River Spey SAC																								
Atlantic salmon	×a	×a	×a	×b	×b	×b	✓c	×c	×c		×d			✓e			×f		×g	×g	×g	✓h	✓h	×h
Freshwater pearl mussel	×a	×a	×a	×b	×b	×b	✓c	×c	×c		×d			✓e			×f		×g	×g	×g	✓h	✓h	×h
Sea lamprey	×a	×a	×a	×b	×b	×b	✓c	×c	×c		×d			✓e			×f		×g	×g	×g	✓h	✓h	×h
Berriedale and Langwell Waters SAC																								
Atlantic salmon	×a	×a	×a	×b	×b	×b	✓c	×c	×c		×d			✓e			×f		×g	×g	×g	✓h	✓h	×h
River Teith SAC																								
Atlantic salmon	×a	×a	×a	×b	×b	×b	✓c	×c	×c		×d			✓e			×f		×g	×g	×g	✓h	✓h	×h
Sea lamprey	×a	×a	×a	×b	×b	×b	✓c	×c	×c		×d			✓e			×f		×g	×g	×g	✓h	✓h	×h
River Oykel SAC																								
Atlantic salmon	×a	×a	×a	×b	×b	×b	✓c	×c	×c		×d			✓e			×f		×g	×g	×g	✓h	✓h	×h
Freshwater pearl mussel	×a	×a	×a	×b	×b	×b	✓c	×c	×c		×d			✓e			×f		×g	×g	×g	✓h	✓h	×h

The text below explains the conclusion of whether LSE can be ruled out for a given impact. The impacts are categorised by letter which correspond to a letter within the table. Within the table where a LSE cannot be ruled out for a given impact a ✓ symbol is included and the box is highlighted in blue, where a LSE has been ruled out a × symbol is included and highlighted green. Where effects are not applicable to a particular feature they are greyed out.

a. **Temporary habitat/disturbance** – There is no spatial overlap with the construction, operation and maintenance and decommissioning activities associated with the Array and any of the nine SACs with Annex II diadromous fish and freshwater pearl mussel features, nor are there predicted to be any indirect impacts on these features which may lead to an LSE, as noted in paragraph 124. Therefore, it can be concluded that there is no potential for LSE on Annex II diadromous fish and freshwater pearl mussel features of any SAC due to temporary habitat loss/disturbance during all phases.

b. **Increases in SSC and associated sediment deposition** - The extent of this impact, across all phases of the Array, will be spatially restricted to within the boundaries of the Array and the surrounding area. All SACs are located well outside the ZoI for increases in SACs and associated sediment deposition (the closest is 80.57 km from the site boundary) (see paragraphs 125 to 127). Therefore there is no potential for LSE on Annex II diadromous fish and freshwater pearl mussel features of any SAC from this impact during all phases.

c. **Subsea noise –** As set out in paragraph 128, there is potential for diadromous species to be present within or transiting through the Array and potential area of impact (injury and behavioural) from subsea noise during construction. It is therefore concluded that there is potential for LSE on Annex II diadromous fish and freshwater pearl mussel features of all nine SACs during the construction phase, due to subsea noise from piling and UXO clearance. As set out in paragraphs 142 and 143, noise levels will be substantially lower during the operation and maintenance phase and decommissioning phase (as there will be no piling or UXO clearance), it is concluded that there is no potential for LSE on Annex II diadromous fish and freshwater pearl mussel qualifying interest features of any SAC due to this impact during these phases.

d. **Long term habitat loss -** There is no direct spatial overlap between the footprint of the Array and any of the nine SACs with Annex II diadromous fish and freshwater pearl mussel features, nor are there predicted to be any indirect impacts on these features which may lead to an LSE, as noted in paragraphs 136 to 138. Therefore, it can be concluded that there is no potential for LSE on Annex II diadromous fish and freshwater pearl mussel features of any SAC from long term habitat loss during all phases.

e. **EMF –** As set out in paragraph 145, EMF emitted from subsea electrical cabling (including dynamic cabling) has the potential to interfere with the navigation of diadromous fish. It is considered that there is potential for LSE on the Annex II diadromous fish and freshwater pearl mussel features of all nine SACs from EMF during the operation and maintenance phase.

f. **Colonisation of hard structures -** Artificial structures placed on the seabed (e.g. anchor mooring systems and OSP foundations) are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity and potential changes in prey/predator interactions. However, as set out in paragraphs 147 to 148, effects on diadromous fish populations during the operation and maintenance phase are expected to be limited and therefore it can be concluded that there is no potential for LSE on any Annex II diadromous fish qualifying interest features of any SAC from the colonisation of hard structures during the operation and maintenance phase.

g. **Accidental pollution -** There is a risk of pollution being accidentally released from vessels and equipment involved during all phases of the Array. As set out in paragraphs 130 to 132, pollution events are considered unlikely, and should an event occur effects will be temporary, reversible and limited in spatial extent. Considering the large distance to the SACs (closest SAC is 80.57 km from the site boundary) any effects should they occur, will not directly affect the SACs, nor will they lead to disruption of migration of Annex II diadromous fish species to and from this SAC. In addition, it is anticipated that the risk of such events occurring will be further managed by the implementation of measures set out in standard post consent plans (e.g. an EMP, including a MPCP) which will be implemented as part of the Array. While these plans are not considered in the determination of no LSE, they will nevertheless reduce the potential for LSE. On this basis, it is concluded there is no potential for LSE on any Annex II diadromous fish and freshwater pearl mussel features of the SAC as a result of accidental pollution during all phases.

h. **In-combination effects –** Construction, operation and maintenance activities and decommissioning activities associated with other plans and projects in the surrounding area have the potential to result in a LSE on Annex II diadromous fish and freshwater pearl mussel features of the nine SACs as a result of in-combination effects across all phases of the Project Array. Where the potential for LSE has been concluded alone, the potential for LSE has been concluded in-combination. These in-combination effects are subsea noise in the construction phase and EMF in the operation and maintenance phase.

5.3. ASSESSMENT OF LSE FOR ANNEX II MARINE MAMMALS

157. A total of 24 European sites designated for Annex II marine mammals were identified in the initial screening process (section 4.3) to be taken forward for determination of LSE. These sites are listed in full in Table 4.2 and include the following:

- five sites in the UK:
  - Berwickshire and North Northumberland Coast SAC;
  - Firth of Tay and Eden Estuary SAC;
  - Isle of May SAC;
  - Southern North Sea SAC; and
  - Moray Firth SAC.
- eleven sites in Germany;
- five sites in Denmark;
- two sites in the Netherlands; and
- one site in Sweden.

5.3.1. PATHWAYS FOR LSE: POTENTIAL IMPACTS ON ANNEX II MARINE MAMMALS

158. The following sections present the potential impacts and effects on marine mammals that may result from the development of the Array. These impacts will be taken into account when determining the potential for LSE on the European sites and relevant marine mammal qualifying interest features presented in section 4.3. The potential impacts on marine mammals have been informed by NatureScot and Natural England's 'Advice on Operations' for the relevant SACs (Natural England and NatureScot, 2021), and experience and knowledge gained during previous offshore wind farm projects.

Construction phase

Subsea noise from piling

159. Impact piling during the construction phase may result in auditory injury (Permanent Threshold Shift (PTS) or Temporary Threshold Shift (TTS)) and/or behavioural disturbance or displacement of marine mammals as a result of increased subsea noise levels.

Harbour porpoise

160. Harbour porpoise were the most abundant marine mammal species recorded during the first year of the ongoing site-specific aerial surveys (March 2021 to February 2023), with 825 individuals reported between March 2021 to September 2022. They were the only species to be recorded every month, with sightings typically higher in the summer months. At this stage, no density estimates are available from the site-specific surveys, however the density estimate for the most recent Small Cetaceans in European Atlantic Waters of the North Sea (SCANS) survey was 0.599 individuals per km^2 (CV: 0.287) in the relevant block (Block R; Hammond *et al.,* 2017, 2021). The predicted density surface of harbour porpoise in the vicinity of the site boundary is between 0.5 to 1.2 animals per km^2 (Appendix 3 by Lacey and Hammond in Hague *et al*., 2020).

161. Harbour porpoise from the Southern North Sea SAC have the potential to be present (i.e. foraging) within the site boundary and the potential ZoI of subsea noise due to piling. The next nearest European sites identified in section 4 are the Dutch and German components of the Dogger Bank SAC (Doggersbank and Doggerbank, respectively), which are located 234.54 km and 246.56 km respectively from the site boundary. The potential for harbour porpoise from the Dogger Bank SACs to be present within the site boundary and potential ZoI from piling is therefore, considerably lower than that of the Southern North Sea SAC, as these sites are over 100 km further than the Southern North Sea SAC (Table 4.2). All other European sites designated for harbour porpoise are located over 300 km from the site boundary, and a significant effect is considered unlikely. Therefore, all transboundary sites for harbour porpoise are screened out for this impact.

162. On this basis, there is potential for LSE on harbour porpoise qualifying interest features of the Southern North Sea SAC as a result of increased subsea noise from piling during the construction phase, and this impact is screened in for further consideration for this SAC.

Bottlenose dolphin

163. The current population estimate of the resident bottlenose dolphin population in the Moray Firth is 224 individuals (CV: 0.02, 95% CI: 241 to 234), based on estimates from Arso Civil *et al*. (2021). It is estimated that an average of 52.5% of this resident population use the waters within the St Andrews Bay and Tay Estuary, and the waters around Montrose and the Firth of Tay are observed as areas with consistently high use (Arso Civil *et al.,* 2019). However, between March 2021 and September 2022 there were no bottlenose dolphin sightings within the site-specific aerial surveys undertaken within the site boundary. During the site-specific aerial surveys for the nearby Berwick Bank Offshore Wind Farm, there were two sightings of a total of seven individuals recorded (SSER, 2022), although this is considerably further inshore. The species is therefore, considered likely to be present in the coastal waters of the north-east of Scotland in low numbers, and with little to no connectivity to the Array.

164. Furthermore, the disturbance and injury range due to increased subsea noise during piling is likely to be lower for bottlenose dolphin in comparison to harbour porpoise. This is due to the differing hearing frequencies of the two species; bottlenose dolphin are mid-frequency cetaceans, while harbour porpoise are high frequency cetaceans. As stated in paragraph 163, there is limited potential for individuals of the Moray Firth SAC to be transiting through or foraging within the Array.

165. On this basis, there is no potential for LSE on bottlenose dolphin qualifying interest features of this SAC as a result of increased subsea noise from piling during the construction phase, and this impact is screened out for further consideration for this SAC.

Grey seal

166. Grey seal were observed year-round during the first year of the site-specific aerial surveys for the site boundary, with a total of 26 individuals recorded over ten sightings. Telemetry data from tagged individuals also shows overlap between grey seal movement from coastal sites along the northeast coast of the UK and the site boundary, however activity is higher further inshore (Figure 5.1; Sinclair, 2021). These data also suggest connectivity between the site boundary and the Isle of May SAC and the Berwickshire and North Northumberland Coast SAC (Sinclair, 2021).

167. August haul out counts for the East Scotland MU were 3,683 individuals in the 2016-2019 survey (Morris *et al.,* 2021). These counts account for 14% of grey seal hauled out in Scotland and 9% of grey seal hauled out in the UK between 2016 and 2019. August haul out counts for the Moray Firth MU population were 1,657 individuals in the 2016-2019 survey (Morris *et al.,* 2021). There are infrequent counts for the Northeast England MU, with grey seal primarily present in the Northumberland and The Tees areas. These counts show a significant increase from 613 individuals in the 1996-1997 period to 6,565 individuals in the 2016-2019 period (SMRU, 2022).

168. Grey seal have been shown to display a diverse range of responses to piling, such as no behavioural change, changes in swim direction from the piling source, altered surfacing and diving behaviour (which suggests a transition from foraging to horizontal movement), swimming inshore, swimming perpendicular to the source, and stopping altogether (Aarts *et al.,* 2018). On average, behavioural changes were greater and more frequent at lower distances from the source (< 30 km), although individuals exposed to piling returned to the same area on subsequent trips, even at close distances to the source (< 30 km; Kirkwood *et al.,* 2015 and Aarts *et al.,* 2018).

169. As previously discussed in section 4.3, grey seals can forage up to (and sometimes over) 100 km from haul out sites, however typically not more than 20 km during the breeding season. Following a precautionary approach and based on the site-specific aerial data and telemetry data presented in Sinclair (2021) (Figure 5.1), LSE from increased subsea noise at the Berwickshire and North Northumberland Coast SAC and the Isle of May SAC cannot be excluded at this stage, despite them being slightly over 100 km from the site boundary (113.95 km and 129.50 km, respectively).

170. On this basis, there is potential for LSE on grey seal qualifying interest features of these SACs as a result of increased subsea noise from piling during the construction phase, and this impact is screened in for further consideration for this SAC on a conservative basis.

Harbour seal

171. There were three harbour seal observed during two sightings between March 2021 and September 2022 during the site-specific surveys for the site boundary. Telemetry data from tagged individuals within the Firth of Tay and Eden Estuary SAC demonstrated that harbour seal largely did not overlap with the site boundary, however there were several isolated instances (Figure 5.2) (Sinclair, 2021). These data also suggest low connectivity between the site boundary and the Firth of Tay and Eden Estuary SAC, which is designated for harbour seal as a primary feature.

172. There is evidence that harbour seal exhibits a short term behavioural response to piling. Previous tracking studies have demonstrated clear avoidance of harbour seal from offshore wind farms during piling, at distances of up to 25 km from the piling source. This avoidance behaviour has been demonstrated to be temporary and confined to periods of active piling, as harbour seal distribution returns to pre-piling levels within two hours of piling ending (Russel *et al.,* 2016; SCOS, 2018).

173. As previously discussed in section 4.3, harbour seal typically forage between 40 km to 50 km from haul out sites, yet a precautionary distance of 100 km has been adopted when identifying European sites. It has been concluded that an LSE from increased subsea noise due to piling is unlikely due to the isolated and low sightings from the site-specific surveys, evidence of minimal connectivity presented in Sinclair (2021) (Figure 5.2), and the large distance between the site boundary and the Firth of Tay and Eden Estuary SAC (121.55 km).

174. On this basis, there is no potential for LSE on harbour seal qualifying interest features of this SAC as a result of increased subsea noise from piling during the construction phase, and this impact is screened out of further consideration for this SAC.

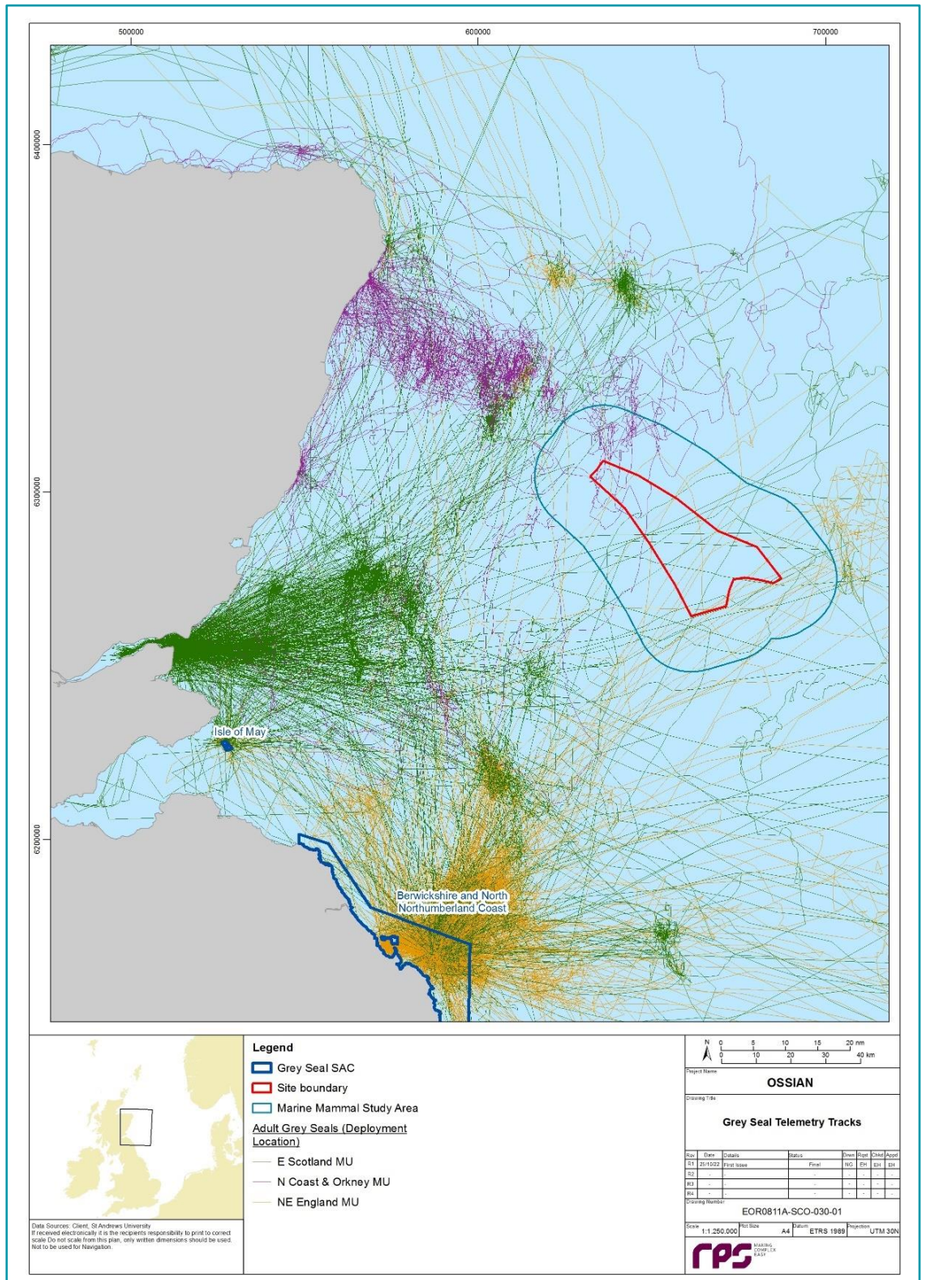


Figure 5.1: Telemetry Tracks for Tagged Grey Seal (Source: Sinclair, 2021)

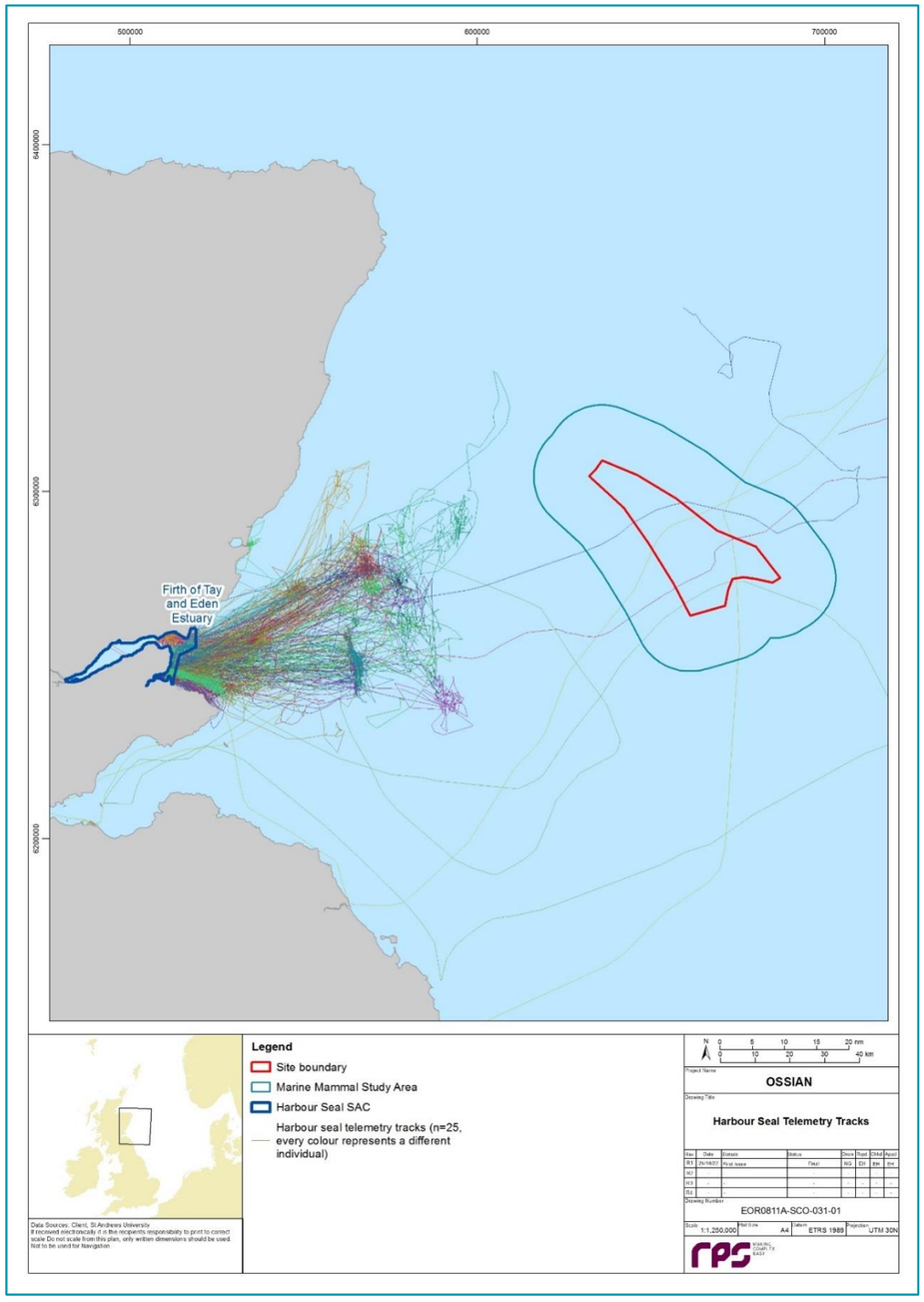


Figure 5.2: Telemetry Tags for Tagged Harbour Seal (Source: Sinclair, 2021)

Subsea noise from UXO clearance

175. There may be a requirement for the clearance of UXOs during the construction phase of the Array. It is proposed that UXO clearance will be implemented via low order deflagration, which uses the detonation of a series of small charges. This process will result in increased subsea noise, which could cause TTS, PTS, and/or behavioural disturbance and displacement of marine mammals.

Harbour porpoise

176. As detailed in paragraphs 160 and 161, harbour porpoise from the Southern North Sea SAC have the potential to be present within the site boundary and therefore the potential ZoI from elevated subsea noise during UXO clearance.

177. On this basis, there is potential for LSE on harbour porpoise qualifying interest features of this SAC as a result of increased subsea noise from UXO clearance during the construction phase, and this impact is screened in for further consideration for this SAC. All other European sites designated for harbour porpoise are located over 200 km from the site boundary and a significant effect occurring within these sites is considered to be unlikely. Therefore, all other European sites for harbour porpoise are screened out for this impact.

Bottlenose dolphin

178. As detailed in paragraphs 163 and 164, bottlenose dolphin from the Moray Firth SAC are unlikely to be foraging or transiting through the site boundary, and therefore the potential ZoI from elevated subsea noise during UXO clearance.

179. On this basis, there is no potential for LSE on bottlenose dolphin qualifying interest features of this SAC as a result of increased subsea noise from UXO clearance during the construction phase, and this impact is screened out for further consideration for this SAC.

Grey seal

180. As detailed in paragraphs 166 and 169, grey seal are likely to be present within the site boundary and forage up to (and over) 100 km from haul out sites.

181. On this basis, there is potential for LSE on grey seal qualifying interest features of these SACs as a result of increased subsea noise from UXO clearance during the construction phase, and this impact is screened in for further consideration for these SACs on a conservative basis.

Harbour seal

182. As detailed in paragraphs 171 and 173, harbour seal from the Firth of Tay and Eden Estuary SAC are unlikely to be foraging or transiting through the site boundary, and therefore the potential ZoI from elevated subsea noise during UXO clearance.

183. On this basis, there is no potential for LSE on harbour seal qualifying interest features of this SAC as a result of increased subsea noise from UXO clearance during the construction phase, and this impact is screened out for further consideration for this SAC.

Subsea noise from vessels and other vessel activities

184. Increased subsea noise associated with vessel use and associated activities (e.g. dredging, trenching and rock placement) may result in disturbance of marine mammals. However, the extent of disturbance is likely to be spatially restricted within the site boundary and along the vessel routes used by construction vessels. Out with this, vessels will utilise already established vessel routes, and the subsea noise produced will be dispersed and become part of the baseline vessel traffic noise levels.

Harbour porpoise

185. It is not anticipated that the construction of the Array will cause significant disturbance to harbour porpoise for this impact due to the following factors:

- the nearest European site designated for harbour porpoise is 129.86 km from the site boundary (Southern North Sea SAC);

- the increase in subsea vessel traffic noise will be small in comparison to existing background levels; and
- activities within the site boundary, such as dredging, trenching and rock placement will be intermittent and short term.

186. On this basis, there is no potential for LSE on harbour porpoise qualifying interest features of any European site as a result of increased subsea noise from vessels and other vessel activities during the construction phase, and this impact is screened out from further consideration.

Bottlenose dolphin

187. It is not anticipated that the construction of the Array will cause significant disturbance to bottlenose dolphin for this impact due to the following:

- the nearest European site designated for bottlenose dolphin is 175.86 km from the site boundary (Moray Firth SAC);
- the increase in subsea vessel traffic noise will be small in comparison to existing background levels and is unlikely to impact predominantly coastal individuals;
- activities within the site boundary, such as dredging, trenching and rock placement will be intermittent and short term, and are unlikely to impact predominantly coastal individuals; and
- there have been no sightings of bottlenose dolphins recorded so far during the site-specific aerial surveys, and the resident population in the Moray Firth SAC typically has a more coastal distribution.

188. On this basis, there is no potential for LSE on bottlenose dolphin qualifying interest features of any European site as a result of increased subsea noise from vessels and other vessel activities during the construction phase, and this impact is screened out from further consideration.

Grey seal

189. It is not anticipated that the construction of the Array will cause significant disturbance to grey seal for this impact due to the following:

- the nearest European site designated for grey seal is 113.95 km from the site boundary (Berwickshire and North Northumberland Coast SAC);
- the increase in subsea vessel traffic noise will be small in comparison to existing background level and are unlikely to impact grey seal further inshore and at haul out sites, where densities are higher; and
- activities within the site boundary, such as dredging, trenching and rock placement will be intermittent and short term, and are unlikely to impact grey seal further inshore and at haul out sites, where densities are higher.

190. On this basis, there is no potential for LSE on grey seal qualifying interest features of any European site as a result of increased subsea noise from vessels and other vessel activities during the construction phase, and this impact is screened out from further consideration.

Harbour seal

191. It Is not anticipated that the construction of the Array will cause significant disturbance to harbour seal for this impact due to the following:

- the nearest European site designated for harbour seal is 121.55 km from the site boundary (Firth of Tay and Eden Estuary SAC);
- the increase in subsea vessel traffic noise will be small in comparison to existing background levels and are unlikely to impact harbour seal further inshore and at haul out sites, where densities are higher;
- there have been low sightings of harbour seal recorded so far during the site-specific aerial surveys (n=3), and the species typically has a more coastal distribution; and
- activities within the site boundary, such as dredging, trenching and rock placement will be intermittent and short term, and are unlikely to impact harbour seal further inshore and at haul out sites, where densities are higher.

192. On this basis, there is no potential for LSE on harbour seal qualifying interest features of any European site as a result of increased subsea noise from vessels and other vessel activities during the construction phase, and this impact is screened out from further consideration.

<u>Vessel collision risk</u>

193. Increased vessel activity in comparison to background levels within the construction phase may result in increased vessel collisions with marine mammals. However, the extent of disturbance is likely to be spatially restricted within the site boundary and along the vessel routes to ports. Out with this, vessels will utilise already established vessel routes, and the subsea noise produced will be dispersed and become part of the baseline vessel traffic levels.

Harbour porpoise

194. There will be a relatively low increase in vessel traffic during the construction of the Array, in comparison to background levels. Furthermore, the majority of the vessels involved in the construction phase will be slow moving or stationary within the site boundary. As presented in Schoeman *et al.,* (2020), the two key factors that determine the risk of a collision are the presence of marine mammals and vessels in the same area and whether those animals are regularly exposed to vessels. As vessel activity around the coast of the north-east of Scotland is relatively high, there is only a small increase in vessel presence due to the construction of the Array. The likelihood of collisions is therefore low as marine mammals in this area are likely to already maintain distance from vessels. Therefore, there is low potential for significant impacts to harbour porpoise from increased collision risk with vessels during the construction phase.

195. On this basis, there is no potential for LSE on harbour porpoise qualifying interest features of any European site due to collision with vessels during the construction phase, and this impact is screened out from further consideration for all sites.

Bottlenose dolphin

196. As detailed for harbour porpoise in paragraph 194, there is only likely to be a small increase in vessel presence due to the construction of the Array, and the likelihood of a collision occurring is low. Therefore, there is low potential for significant impacts to bottlenose dolphin in terms of increased collision risk with vessel during the construction phase.

197. On this basis, there is no potential for LSE on bottlenose dolphin qualifying interest features of any European site due to collision with vessels during the construction phase, and this impact is screened out from further consideration for all sites.

Grey seal

198. As detailed in paragraphs 166 and 169, grey seal are considered to be present within the site boundary and forage up to (and over) 100 km from haul out sites, with evidence of connectivity between the site boundary and the Isle of May SAC and the Berwickshire and North Northumberland Coast SAC. However, not all grey seal within the site boundary would be simultaneously at risk of collision due to the limited number of vessels operating at once and they would only be at risk at the water's surface. The Advice on Operations for the SACs screened in (e.g. Natural England and NatureScot, 2021) identify collision risk for grey seal, however the text draws on the risk of corkscrew injuries from vessels which is no longer considered to be an impact associated with vessel movements (Brownlow *et al.,* 2016; Bishop *et al.,* 2016). The Advice on Operations acknowledges that, in general, instances of injury or mortality of grey seal caused by vessels remains a very rare occurrence in UK waters (Natural England and NatureScot, 2021).

199. As detailed for harbour porpoise in paragraph 194, there is only likely to be a small increase in vessel presence due to the construction of the Array, and the likelihood of a collision occurring is considered to be low. Therefore, there is low potential for significant impacts to grey seal from increased collision risk with vessels during the construction phase.

200. On this basis, there is no potential for LSE on grey seal qualifying interest features of any European site due to collision with vessels during the construction phase, and this impact is screened out from further consideration for all sites.

Harbour seal

201. As discussed above in paragraph 198 for grey seal, harbour seal would only be at risk of vessel collision when at the water surface. Furthermore, harbour seal presence in the site boundary is considered to be lower than that of grey seal. As detailed for harbour porpoise in paragraph 194, there is only likely to be a small increase

in vessel presence due to the construction of the Array, and the likelihood of a collision occurring is considered to be low. Therefore, there is low potential for significant effects on harbour seal from increased collision risk with vessels during the construction phase.

202. On this basis, there is no potential for LSE on harbour seal qualifying interest features of any European site due to collision with vessels during the construction phase, and this impact is screened out from further consideration for all sites.

Changes in prey availability

203. Changes in marine mammal prey abundance and distribution could occur as a result of increased subsea noise levels or construction activities that disturb the seabed (and cause increased SSCs). Potential impacts upon prey species may affect marine mammal foraging within the vicinity of the site boundary. Fish are key prey for marine mammals in the North Sea, including clupeids (e.g. herring *Clupea harengus*), gadoids (e.g. cod *Gadus morhua* and whiting *Merlangius merlangus*), sandeels (*Ammodytes spp.*) and flatfish species. As assessed in the Array EIA Scoping Report, these species are an important component of the fish and shellfish ecology within the vicinity of the site boundary. As detailed in paragraph 125, increases in SSC and associated sediment deposition are scoped out for all marine mammal species in the Array EIA Scoping Report, therefore are unlikely to affect prey availability.

Harbour porpoise

204. Increased subsea noise during the construction phase (particularly during piling) is likely to cause the widest ranging effect on prey species. Harbour porpoise have a large foraging range within the North Sea, and impacts to the prey fish community as a result of the construction of the Array will be short term and temporary. However, project specific subsea noise modelling is required to fully assess the effect of subsea noise on prey species. At the time of writing, this modelling has not been completed, and will be undertaken during the EIA process. Until the results of this modelling are available, this impact cannot be screened out for this species.

205. On this basis, LSE cannot be ruled out at this stage for harbour porpoise from the Southern North Sea SAC due to changes in prey availability during the construction phase. This is therefore screened in for further consideration on a conservative basis.

Bottlenose dolphin

206. Bottlenose dolphin are unlikely to be impacted by changes in prey availability given that there have been no sightings in the site-specific aerial surveys, the typically coastal nature and foraging habitat of the Moray Firth resident bottlenose dolphin population, and that any potential temporary changes to the fish community as a result of the construction of the Array (such as increased subsea noise) are likely to be short term and temporary.

207. On this basis, there is no potential for LSE for bottlenose dolphin qualifying interest features from the Moray Firth SAC due to changes in prey availability during the construction phase and this impact is screened out from further consideration for this site.

Grey seal

208. As discussed in paragraphs 166 and 169, grey seal are likely to occur within the site boundary and forage up to (and over) 100 km from haul out sites, with evidence of connectivity between the site boundary and the Isle of May SAC and the Berwickshire and North Northumberland Coast SAC. Thus, it is likely that the site boundary overlaps with foraging grounds for grey seal from both SACs. Nonetheless, effects on fish populations due to the construction of the Array (such as increased subsea noise) are likely to be short-term and temporary and unlikely to result in significant effect for grey seal. As in paragraph 204 for harbour porpoise, this impact cannot be screened out for grey seal until the results of the subsea noise modelling are available.

209. On this basis, LSE cannot be ruled out at this stage for grey seal from the Isle of May SAC and the Berwickshire and North Northumberland Coast SAC due to changes in prey availability during the construction phase. These sites are therefore screened in for further consideration on a conservative basis.

Harbour seal

210. As discussed in paragraphs 171 and 173, harbour seal have low potential to occur within the site boundary and there is low connectivity to the Firth of Tay and Eden Estuary SAC. Therefore, it is unlikely that the site boundary largely overlaps with foraging grounds for this species. As harbour seal foraging ranges tend to occur up to 50 km from shore, impacts to the fish communities within the vicinity of the site boundary are unlikely to result in a significant effect on harbour seal. In addition, effects on fish populations due to the construction of the Array (such as increased subsea noise) are likely to be short-term and temporary.

211. On this basis, there is no potential for LSE for harbour seal qualifying interest features from the Firth of Tay and Eden Estuary SAC due to changes in prey availability during the construction phase and this impact is screened out from further consideration for this site.

Changes in water clarity

212. Construction activities which disturb the sediment (such as seabed preparation, and foundation and cable installation) may cause temporary SSC increases and alter water clarity. This could impact marine mammal foraging ability directly. Changes in water quality will be spatially restricted to the site boundary and the nearby surrounding vicinity. Indirect effects of increased SSCs and are also considered in 'Changes in prey availably' above. As detailed in paragraph 125, increases in SSC and associated sediment deposition are scoped out for all marine mammal species in the Array EIA Scoping Report.

Harbour porpoise

213. Elevated SSCs, turbidity, and reduced water clarity are unlikely to adversely affect harbour porpoise foraging as this species is known to forage in areas with high tidal flows (and thus poor visibility; Pierpoint, 2008). Furthermore, harbour porpoise are odontocetes, and are able to use echolocation to navigate their surroundings and forage, which is not affected by water clarity and visibility. Finally, there is likely to already be a large natural variability in SSCs within the regional marine mammal study area, due to its proximity to the Firth of Forth estuary and other smaller estuaries. As such, marine mammals living in the vicinity are likely to already be tolerant to temporary SSC increases, such as those associated with the construction of the Array. Overall, it is concluded that there is low potential for significant impacts to harbour porpoise from changes in water clarity during the construction phase.

214. On this basis, there is no potential for LSE on harbour porpoise qualifying interest features of any European site due to changes in water quality during the construction phase, and this impact is screened out from further consideration for all sites.

Bottlenose dolphin

215. As above for harbour porpoise, bottlenose dolphins use echolocation to forage and are likely to be adapted to and tolerant of turbid environments within the regional marine mammal study area. Further, as discussed in paragraph 206, the site boundary is not likely to largely overlap with bottlenose dolphin foraging grounds and there have been no sightings of this species in the site-specific aerial surveys. On this basis and considering that changes in water quality during the construction phase will be localised and temporary, this impact is unlikely to result in significant impacts to bottlenose dolphin.

216. On this basis, there is no potential for LSE on bottlenose dolphin qualifying interest features of any European site due to changes in water quality during the construction phase, and this impact is screened out from further consideration for all sites.

Grey seal

217. Grey seal are adapted to turbid environments and are able to navigate and forage in conditions of poor visibility and decreased water clarity (Todd *et al.,* 2014). They can also detect movement with their mystacial vibrissae (whiskers) in low visibility. Although the site boundary does overlap with foraging grounds for grey seal, the changes in water quality during the construction phase will be localised and temporary, and this impact is unlikely to result in significant impacts to grey seal.

218. On this basis, there is no potential for LSE on grey seal qualifying interest features of any European site due to changes in water quality during the construction phase, and this impact is screened out from further consideration for all sites.

Harbour seal

219. Harbour seal frequently occur in turbid environments due to their coastal nature and are able to forage in turbid waters and poor visibility (Hastie *et al.,* 2016) and can detect movement and hydrodynamic trails with their mystacial vibrissae (Dehnhardt *et al*., 2001; Grant *et al*., 2013). Furthermore, as discussed in paragraph 210, harbour seal foraging activity within the site boundary is likely to be low, especially in comparison with that of grey seal. On this basis and considering that changes in water quality during the construction phase will be localised and temporary, this impact is unlikely to result in significant impacts to harbour seal.

220. On this basis, there is no potential for LSE on harbour seal qualifying interest features of any European site due to changes in water quality during the construction phase, and this impact is screened out from further consideration for all sites.

Accidental pollution

All species

221. There is a risk of pollution being accidentally released from vessels and equipment involved during the construction phase of the Array. Pollution events are considered unlikely, and given the volumes associated with offshore wind farm developments, should an event occur, effects will be temporary, reversible and limited in spatial extent (e.g. due to the expected low volumes of pollutants associated with offshore wind developments). Furthermore, considering the large distances to the SACs identified, (the nearest site being the Berwickshire and North Northumberland Coast SAC which is located approximately 114 km from the Array) any effects should they occur, will not directly affect the SACs. As noted above, any indirect effects on Annex II marine mammal qualifying interests from accidental release of pollutants would be unlikely and should they occur these would be unlikely to lead to a significant effect on conservation objectives of the site (of seal breeding grounds, for example).

222. In addition, the risk of pollution events will be managed by the implementation of measures set out in standard post consent plans (e.g. an EMP, including a MPCP, and an appropriate CoCP) which will be implemented as part of the Array, notwithstanding potential pathways to European sites. These plans include planning for accidental spills, address all potential contaminant releases and include key emergency contact details. They will adhere to good industry practice and guidelines produced by OSPAR, The IMO and MARPOL. Whilst these measures are not required to exclude LSE on Annex II marine mammal features, these will nonetheless reduce both the likelihood of pollution events occurring and the severity of such events should they occur.

223. On this basis, there is no potential for LSE on any Annex II marine mammal qualifying interest features of European sites as a result accidental pollution during the construction phase, and this impact is screened out from further consideration for all European sites

Operation and maintenance phase

Subsea noise from vessels and other vessel activities

224. Increased vessel traffic and activities (such as cable reburial during repairs) during the operation and maintenance phase may result in disturbance to marine mammals. As discussed above for the construction phase, the extent of any potential disturbance associated with this impact will be spatially restricted to the site boundary and along vessel routes to nearby ports. Vessel movements along these routes will be dispersed and form part of the background traffic and subsea noise levels.

All species

225. As above in paragraphs 185 to 199 it is considered that subsea noise from vessels and other vessel activities during the operation and maintenance phase will not result in significant effects to any of the Annex II marine mammal species.

226. On this basis, there is no potential for LSE on Annex II marine mammal qualifying interest features of any European site due to subsea noise from vessels and other vessel activities during the operation and maintenance phase, and this impact is screened out from further consideration for all sites.

Vessel collision risk

All species

227. Increased vessel activity in comparison to background levels within the operation and maintenance phase may result in increased vessel collisions with marine mammals. However, as discussed above for the construction phase, the extent of disturbance is likely to be spatially restricted within the site boundary and along the vessel routes to ports. Out with this, vessels will utilise already established vessel routes, and the subsea noise produced will be dispersed and become part of the baseline vessel traffic levels.

228. As discussed above for the construction phase in paragraphs 193 to 201, it is considered that increased vessel collision risk during the operation and maintenance phase is unlikely and will not result in significant effects on any Annex II marine mammal species.

229. On this basis, there is no potential for LSE on Annex II marine mammal qualifying interest features of any European site due to collision with vessels during the operation and maintenance phase, and this impact is screened out from further consideration for all sites.

Changes in prey availability

All species

230. Changes in marine mammal prey abundance and distribution could occur due to the presence of offshore infrastructure and as a result of operation and maintenance activities that disturb the seabed (and cause increased SSCs) or increase subsea noise levels. Marine mammal foraging may be affected by impacts to prey species within the site boundary (such as cod, flatfish, herring, sandeels and whiting). In comparison, however, subsea noise levels will be significantly lower in the operation and maintenance phase (i.e. no piling), therefore, the potential for adverse effects on these prey species as a result is greatly reduced. Similarly, seabed disturbance and associated increased SSCs will also be substantially lower in the operation and maintenance phase, namely occurring during cable or foundation maintenance activities.

231. On this basis, there is no potential for LSE on any Annex II marine mammal qualifying interest features of any European sites as a result of changes in prey availability during the operation and maintenance phase, and this impact is screened out from further consideration for all European sites.

Operational noise from anchor mooring lines

232. Previous studies have demonstrated that operational noise produced by turbines will have negligible effects on marine mammals (Teilmann *et al.,* 2006a, 2006b; CEFAS, 2010; Brasseur *et al*., 2012; Tougaard *et al*., 2020) and the noise generated has been demonstrated to be much lower than levels associated with construction activities (such as piling; Madsen *et al.,* 2006). However, these studies are not based on floating wind turbine technology, of which there is currently very limited research. The anchor mooring lines utilised in floating wind turbine technology could produce subsea noise during the operation and maintenance phase, and there is limited information available on this impact.

Harbour porpoise

233. As discussed in paragraph 160, harbour porpoise from the Southern North Sea SAC have the potential to be present within the site boundary. As floating offshore wind technology is still in its infancy, there are no data available to assess this impact. Therefore, on a precautionary basis, operational noise from anchor mooring lines cannot be ruled out for harbour porpoise features of this SAC.

234. On this basis, there is potential for LSE on harbour porpoise qualifying interest features of this SAC as a result of operational noise from anchor mooring lines in the operation and maintenance phase, and this impact is screened in for further consideration.

Bottlenose dolphin

235. As discussed in paragraphs 163 and 206, bottlenose dolphin from the Moray Firth SAC are unlikely to be present within the site boundary nor utilise this area as a foraging ground.

236. On this basis, there is no potential for LSE on bottlenose dolphin qualifying interest features of this SAC as a result of operational noise from anchor mooring lines in the operation and maintenance phase, and this impact is screened out of further consideration.

Grey seal

237. As discussed in paragraphs 166 and 169, grey seal from the Berwickshire and North Northumberland Coast SAC and the Isle of May SAC have the potential to be present and foraging within the site boundary. As per paragraph 234 above for harbour porpoise, this impact cannot be ruled out for grey seal features of these SACs.

238. On this basis, there is potential for LSE on grey seal qualifying interest features of these SACs as a result of operational noise from anchor mooring lines in the operation and maintenance phase, and this impact is screened in for further consideration.

Harbour seal

239. As discussed above in paragraphs 171and 173, harbour seal qualifying interest features of the Firth of Tay and Eden Estuary SAC are unlikely to be present within the site boundary nor utilise this area as a foraging ground.

240. On this basis, there is no potential for LSE on harbour seal qualifying interest features of this SAC as a result of operational noise from anchor mooring lines in the operation and maintenance phase, and this impact is screened out of further consideration.

<u>EMF</u>

241. Electrical cabling associated with the Array has the potential to emit localised EMFs. While the effects of EMF on fish and shellfish receptors are documented, there is no evidence of EMF related to offshore wind farms having any negative impact on marine mammals (Copping, 2018; Copping *et al*., 2020). Furthermore, there are no regulatory thresholds or guidelines that define acceptable levels of EMF emissions into the marine environment (Copping *et al.,* 2020). There is no evidence that seals can detect or respond to EMF, however some cetacean species, may be sensitive and/or able to detect variations in magnetic fields (Normandeau, 2011; Czech-Damal *et al.,* 2012; Hüttner *et al.*, 2022). Until recently, the Guiana dolphin *Sotalia guianensis* was the only marine mammal species demonstrated to respond to EMFs (Czech-Damal *et a*l., 2012, 2013). The Guiana dolphin possesses an electroreceptive system, which involves vibrissal crypts on their rostrum to detect weak electrical fields generated by their prey fish (Czech-Damal *et al.,* 2012). As the Guiana dolphin only occurs in Central and South American waters, it is not present within the scope of this assessment. However, recent experimental evidence suggests that adult bottlenose dolphins possess many basic morphological similarities in their vibrissal crypts to Guiana dolphins and can perceive as equally low electrical fields (Hüttner *et al.,* 2022). The authors suggest that bottlenose dolphins use electroreception to detect benthic prey at short ranges and suggest that as this ability has now been observed in two dolphin species, it may be widespread within odontocetes (Hüttner *et al*., 2022).

Cetaceans

242. As discussed, a recent study by Hüttner *et al*. (2022) suggests that bottlenose dolphins, and by extrapolation other cetaceans, may be able detect EMFs. However, as the effects of EMFs are most significant within metres from the cabling and due to the wide-ranging nature of harbour porpoise and bottlenose dolphin and variation within the water column, it is unlikely for a LSE to occur due to this impact. Furthermore, as the Moray Firth SAC resident bottlenose dolphin have a primarily coastal distribution, and harbour porpoise have a wide distribution throughout the entire North Sea, it is unlikely that either species will be vulnerable to EMFs within the Array at a population level.

243. On this basis, there is no potential for LSE on harbour porpoise or bottlenose dolphin qualifying interest features of any European sites as a result of EMF during the operation and maintenance phase, and this impact is screened out from further consideration for all European sites.

Pinnipeds

244. As discussed in paragraph 241, there is no evidence that seals can detect or respond to EMFs.

245. On this basis, there is no potential for LSE on grey seal or harbour seal qualifying interest features of any European sites as a result of EMF during the operation and maintenance phase, and this impact is screened out from further consideration for all European sites

<u>Entanglement</u>

246. The presence of anchor mooring lines associated with the floating technology of the Array could cause entanglement of marine mammals themselves (i.e. primary entanglement), but lost or discarded fishing gear and other marine debris has the potential to become snagged to anchor mooring lines and cause entanglement during the operation and maintenance phase (i.e. secondary entanglement) (Maxwell, *et al,.* 2022). Secondary entanglement poses a threat to marine mammals present within the site boundary, particularly if they are diving and foraging in the water column near the mooring lines (Kirkwood *et al.,* 1997; Stelfox *et al.,* 2016).

Harbour porpoise

247. As discussed in paragraph 160, harbour porpoise from the Southern North Sea SAC have the potential to be present within the site boundary. As floating offshore wind technology is still in its infancy, there are no data available to assess this impact. Therefore, on a precautionary basis, entanglement cannot be ruled out for harbour porpoise features of this SAC.

248. On this basis, there is potential for LSE on harbour porpoise qualifying interest features of this SAC as a result of entanglement in the operation and maintenance phase, and this impact is screened in for further consideration.

Bottlenose dolphin

249. As discussed in paragraphs 163 and 206, bottlenose dolphin from the Moray Firth SAC are unlikely to be present within the site boundary nor utilise this area as a foraging ground.

250. On this basis, there is no potential for LSE on bottlenose dolphin qualifying interest features of this SAC as a result of entanglement in the operation and maintenance phase, and this impact is screened out of further consideration.

Grey seal

251. As discussed in paragraphs 166 and 169, grey seal from the Berwickshire and North Northumberland Coast SAC and the Isle of May SAC have the potential to be present and foraging within the site boundary. As per paragraph 247 for harbour porpoise, this impact cannot be ruled out for grey seal features of these SACs.

252. On this basis, there is potential for LSE on grey seal qualifying interest features of these SACs as a result of entanglement in the operation and maintenance phase, and this impact is screened in for further consideration.

Harbour seal

253. As discussed above in paragraphs 171 and 173, harbour seal qualifying interest features of the Firth of Tay and Eden Estuary SAC are unlikely to be present within the site boundary nor utilise this area as a foraging ground.

254. On this basis, there is no potential for LSE on harbour seal qualifying interest features of this SAC as a result of entanglement in the operation and maintenance phase, and this impact is screened out of further consideration.

Accidental pollution

All species

255. As discussed in paragraphs 221 to 223, significant impacts due to accidental pollution that impact marine mammal species at a population level are considered to be very unlikely.

256. On this basis, there is no potential for LSE on any Annex II marine mammal qualifying interest features of any European sites as a result of accidental pollution during the operation and maintenance phase, and this impact is screened out from further consideration for all European sites.

Decommissioning phase

257. Potential impacts associated with the decommissioning phase are considered to be similar and lower in magnitude than those outlined above in the construction phase (see section 5.3.1) and have not been reiterated.

5.3.2. DETERMINATION OF LSE FOR ANNEX II MARINE MAMMALS

258. Table 5.2 and Table 5.3 present the results of the LSE determination assessment due to the Array for Annex II marine mammal features of the European sites identified. Table 5.2 presents a summary of the LSE Screening for the five UK sites, and Table 5.3 presents the 19 transboundary sites identified for harbour porpoise that were screened into the LSE assessment. These transboundary sites have been combined into a single table as the justifications for the screening decisions were the same due to the distances of each site from the site boundary.

259. The LSE determination assessments were undertaken in the absence of mitigation measures. A brief assessment to support the screening of each effect on the identified species is provided in the table footnotes. Effects that are not applicable are greyed out.

LSE in-combination

260. The LSE test requires consideration of the Array alone and in-combination with other plans and projects. Therefore, it is unnecessary at the LSE stage to consider European sites and qualifying features where an LSE has been identified alone, as in-combination effects will be considered in the Appropriate Assessment stage. At this stage, the focus is to identify European sites and qualifying interest features for which no LSE was concluded, but where there is potential for LSE to occur in-combination with other plans or projects (e.g. due to wide foraging ranges resulting in a species interacting with a large number of projects).

261. As this LSE Screening assessment followed a highly precautionary approach, it is considered that the further information regarding external plans or projects would be unlikely to result in identification of additional European sites or new effect pathways being identified for the screening assessment. For marine mammals, the potential for LSE alone is identified for all UK sites within species range, therefore effects in-combination will be considered at the Appropriate Assessment stage.

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

Table 5.2: LSE Matrix for Annex II Marine Mammal Features of the 5 SACs Identified (C = Construction, O = Operation and Maintenance, D = Decommissioning, ✓ = Potential for LSE, × = No Potential for LSE)

Site and Qualifying Feature of Site	Subsea Noise from Piling			Subsea Noise from UXO Clearance			Subsea Noise from Vessels and Vessel Activities			Vessel Collision Risk			Changes in Prey Availability			Changes in Water Quality			Operational Noise from Anchor Mooring Lines			EMF			Entanglement			Accidental Pollution			In-Combination Effects		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Berwickshire and North Northumberland Coast SAC																																	
Grey seal	✓a			✓b			×c	×c	×c	×d	×d	×d	✓e	×e	×e	×f	×f	×f		✓g			×h			✓i		×j	×j	×j	✓k	✓k	×k
Firth of Tay and Eden Estuary SAC																																	
Harbour seal	×a			×b			×c	×c	×c	×d	×d	×d	×e	×e	×e	×f	×f	×f		×g			×h			×i		×j	×j	×j	×k	×k	×k
Isle of May SAC																																	
Grey seal	✓a			✓b			×c	×c	×c	×d	×d	×d	✓e	×e	×e	×f	×f	×f		✓g			×h			✓i		×j	×j	×j	✓k	✓k	×k
Southern North Sea SAC																																	
Harbour porpoise	✓a			✓b			×c	×c	×c	×d	×d	×d	✓e	×e	×e	×f	×f	×f		✓g			×h			✓i		×j	×j	×j	✓k	✓k	×k
Moray Firth SAC																																	
Bottlenose dolphin	×a			×b			×c	×c	×c	×d	×d	×d	×e	×e	×e	×f	×f	×f		×g			×h			×i		×j	×j	×j	×k	×k	×k

The text below explains the conclusion of whether or not LSE can be ruled out for a given impact. The impacts are categorised by letter which correspond to a letter within the table. Within the table where a LSE cannot be ruled out for a given impact a ✓ symbol is included and the box is highlighted in blue, where a LSE has been ruled out a × symbol is included and highlighted green. Where effects are not applicable to a particular feature they are greyed out.

a: **Subsea noise from piling –** as discussed in paragraphs 160 to 174, there is potential for harbour porpoise features of the Southern North Sea SAC and grey seal features of the Berwickshire and North Northumberland Coast SAC and Isle of May SAC to occur within the ZoI (for both injury and behavioural disturbance) from elevated subsea noise associated with piling during the construction phase. Overall, it is concluded that there is potential for LSE on harbour porpoise and grey seal features of their respective SACs due to this impact during the construction phase.

b: **Subsea noise from UXO clearance –** as discussed in paragraphs 175 to 183, there is potential for harbour porpoise features of the Southern North Sea SAC and grey seal features of the Berwickshire and North Northumberland Coast SAC and Isle of May SAC to occur within the ZoI (for both injury and behavioural disturbance) from elevated subsea noise associated with UXO clearance during the construction phase. Overall, it is concluded that there is potential for LSE on harbour porpoise and grey seal features of their respective SACs due to this impact during the construction phase.

c: **Subsea noise from vessels and other vessel activities –** as discussed in paragraphs 184 to 192, the increase in subsea vessel traffic noise will be small in comparison to existing background levels and activities within the site boundary (such as dredging, trenching and rock placement) will be intermittent and short term. Furthermore, as densities of grey and harbour seal will be higher further inshore and at haul out sites, this impact is considered unlikely to result in significant effects on the species. Overall, there is considered to be no potential for LSE on Annex II marine mammal features of any SAC due to this impact across all phases of the Array.

d: **Vessel collision risk –** as discussed in paragraph 193, the increase in vessel traffic and activity associated with all phases of the Array is likely to be low in comparison to baseline levels. The likelihood of this impact occurring is low, and as such, there is considered to be little potential of increased vessel traffic and activity resulting in a significant impact to Annex II marine mammals in terms of collision risk. Overall, there is considered to be no potential for LSE on Annex II marine mammal features due to this impact across all phases of the Array.

e: **Changes to prey availability –**as discussed in paragraphs 203 to 205, and 208, harbour porpoise features of the Southern North Sea SAC and grey seal features of the Berwickshire and North Northumberland Coast SAC and Isle of May SAC are likely to be present within the site boundary and may forage within the area. Effects on prey fish populations across all phases of the Array are likely to be temporary, of a short duration, localised and not significant. The widest ranging effect will be from increased subsea noise during the construction phase (mainly due to piling) and is unlikely to be significant in other phases. However, as impacts to prey species will be assessed as part of the subsea noise modelling assessment that will be undertaken for the EIA, and impact included for the construction phase as a precaution for harbour porpoise and grey seal features of their respective SACs.

f: **Changes in water quality –** as discussed in paragraphs 212 and 220, changes in water clarity due to increased SSC as a result of seabed disturbance in all phases of the Array are likely to be temporary, of a short duration, and localised within the site boundary. As each of the species are adapted to turbid environments and are able to navigate and forage in such waters, it is unlikely that changes in water quality will result in significant effects. Overall, there is considered to be no potential for LSE on Annex II marine mammal features of any SAC due to this impact across all phases of the Array.

g: **Operational noise from anchor mooring lines–** as discussed above in paragraph 232, subsea noise levels from operational wind turbines are predicted to be low, based on studies from other offshore wind farm projects, however there is a scarcity of research on operational noise levels from anchor mooring lines used in floating wind turbine technology. As discussed in paragraphs 233 to 240, this impact is included as a precaution for harbour porpoise and grey seal features of the Southern North Sea SAC, Berwickshire and North Northumberland Coast SAC, and Isle of May SAC, and not included for bottlenose dolphin features of the Moray Firth SAC and harbour seal features of the Firth of Tay and Eden Estuary SAC. This impact will be assessed for harbour porpoise and grey seal as part of the subsea noise modelling assessment for the Array EIA Report.

h: **EMF –** as discussed in paragraphs 241 and 244, 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 EMFs. Overall, there is considered to be no potential for LSE on Annex II marine mammal features of any SAC due to this impact during the operation and maintenance phase of the Array.

i: **Entanglement –** as detailed above in paragraph 246, primary and secondary entanglement could occur during the operation and maintenance phase, with secondary entanglement posing a greater risk. As above for operational noise, data on secondary entanglement at floating wind turbines are limited. As per paragraphs 247 to 254, there is considered to be potential for LSE on harbour porpoise and grey seal features of their respective SACs due to this impact during the operation and maintenance phase, and no potential for LSE on bottlenose dolphin and harbour seal features of their respective SACs.

j: **Accidental pollution –** as discussed in paragraphs 221 and 222, the Array will follow a good practice approach and appropriate guidance from OSPAR, MARPOL and the IMO regarding minimising accidental pollution at sea. Further, this risk is minimised by a range of designed in measures, such as the development and adherence to an EMP, including a MPCP, and an appropriate CoCP during the construction phase. With adherence to these plans and guidance, significant impacts on Annex II marine mammal features of the SACs and accidental pollution that impacts these species at a population level are considered to be very unlikely. Overall, there is considered to be no potential for LSE on Annex II marine mammal features of any SAC due to this impact across all phases of the Array.

k: **In-combination effects –** Activities associated with planned projects or other activities in the vicinity of the Array have the potential to result in LSE to harbour porpoise and grey seal features of their respective SACs as a result of in-combination effects across all phases of the Array. Where potential for LSE has been concluded alone, the potential for LSE has been concluded in-combination. These in-combination effects are subsea noise from piling and changes in prey availability in the construction phase, and operational noise from anchor mooring lines and entanglement during the operation and maintenance phase.

Table 5.3: LSE Matrix for the 19 Transboundary Sites Identified for Harbour Porpoise (C = Construction, O = Operation and Maintenance, D = Decommissioning, ✓ = Potential for LSE, × = No Potential for LSE)

Qualifying Feature of Site	Subsea Noise from Piling			Subsea Noise from UXO Clearance			Subsea Noise from Vessels and Vessel Activities			Vessel Collision Risk			Changes in Prey Availability			Changes in Water Quality			Operational Noise from Anchor Mooring Lines			EMF			Entanglement			Accidental Pollution			In-Combination Effects		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
Harbour porpoise	×a			×b			×c	×c	×c	×d	×d	×d	×e	×e	×e	×f	×f	×f		×g			×h			×i			×j	×j	×j	×k	×k	×k

The text below explains the conclusion of whether or not LSE can be ruled out for a given impact. The impacts are categorised by letter which correspond to a letter within the table. Within the table where a LSE cannot be ruled out for a given impact a ✓ symbol is included and the box is highlighted in blue, where a LSE has been ruled out a × symbol is included and highlighted green. Where effects are not applicable to a particular feature they are greyed out.

a: **Subsea noise from piling –** given the significant distance between the site boundary and the nearest transboundary site (234.54 km), the site boundary is unlikely to constitute important foraging grounds for individuals from these sites (as discussed in paragraph 161). In addition, subsea noise from piling during construction is unlikely to result in significant effects, in terms of injury and disturbance, on the harbour porpoise features of these sites (as discussed in paragraph 161). Overall, it is concluded that there is no potential for LSE on the harbour porpoise features of any transboundary site due increased subsea noise from piling in the construction phase.

b**: Subsea noise from UXO clearance –** given the significant distance between the site boundary and the nearest transboundary site (234.54 km), the site boundary is unlikely to constitute important foraging grounds for individuals from these sites (as discussed in paragraph 161). In addition, subsea noise from UXO clearance during construction is unlikely to result in significant effects, in terms of injury and disturbance, on the harbour porpoise features of these sites (as discussed in paragraph 161). Overall, it is concluded that there is no potential for LSE on the harbour porpoise features of any transboundary site due increased subsea noise from UXO clearance in the construction phase.

c: **Subsea noise from vessels and other vessel activities** - as discussed in paragraphs 185 and 186, the increase in subsea vessel traffic noise will be small in comparison to existing background levels and activities within the site boundary (such as dredging, trenching, and rock placement) will be intermittent and short term. Given the significant distance between the site boundary and the nearest transboundary site (234.54 km), and that the majority of vessel movements across 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 harbour porpoise features of any transboundary site. Overall, it is concluded that there is no potential for LSE from this impact across all phases of the Array.

d: **Vessel collision risk –** as discussed in paragraphs 193 and 194, the increase in vessel traffic across all phases of the Array is considered to be low compared the baseline levels. Furthermore, the likelihood of collisions between marine mammals and vessels is considered to be low. Furthermore, the nearest transboundary site is 234.54 km from the site boundary. There is therefore considered to be little potential for increased vessel activity to result in a significant effect in terms of collision risk. Overall, it is concluded that there is no potential for LSE to the harbour porpoise feature of any transboundary site from this impact across all phases of the Array.

e: **Changes to prey availability –** as discussed in paragraphs 203 and 204, any impacts to prey fish are anticipated to be temporary, short-term, and localised to the site boundary within the construction phase. Impacts during the operation and maintenance and decommissioning phases are expected to be substantially less than during construction (namely due to no piling occurring). In addition, given that the nearest transboundary site is 234.54 km from the site boundary 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 due to this impact across all phases of the Array.

f: **Changes in water quality –** given that the nearest transboundary site is 234.54 km from the site boundary and the fact that increases in SSC will be localised, short-term and intermittent, this impact is considered unlikely to result in significant effects to the foraging ability of harbour porpoise (as discussed in paragraphs 212 and 213). Overall, it is considered that there is no potential for LSE on the harbour porpoise feature of any transboundary site from this impact.

g: **Operational noise from anchor mooring lines –** as discussed above in paragraph 232, noise levels from operational wind turbines are likely to be low, based on studies from other offshore wind farm projects. Despite the scarcity of research on operational noise levels from floating wind turbine technology, this impact is not considered to result in significant impacts to harbour porpoise features of transboundary sites given that the nearest transboundary site is 234.54 km from the site boundary. Overall, it is considered that there is no potential for LSE on the harbour porpoise feature of any transboundary site from this impact.

h: **EMF –** as discussed above in paragraphs 241 and 242**,** there is some recent evidence that bottlenose dolphin and other odontocetes (such as harbour porpoise) can detect EMFs. However, as the effects of EMFs are most significant within metres from the cabling, this impact is not considered to result in significant impacts to harbour porpoise features of transboundary sites given that the nearest transboundary site is 234.54 km from the site boundary. Overall, it is considered that there is no potential for LSE on the harbour porpoise feature of any transboundary site from this impact.

i: **Entanglement –** as discussed above in paragraph 246, entanglement could occur due to discarded fishing gear and marine debris being caught in anchor mooring lines during the operation and maintenance phase. However, given that the nearest transboundary site is 234.54 km from the site boundary, this impact is not considered to result in significant impacts to harbour porpoise features of transboundary sites. Overall, it is considered that there is no potential for LSE on the harbour porpoise feature of any transboundary site from this impact.

j: **Accidental pollution –** as discussed in paragraphs 221 and 222, the Array will follow a good practice approach and appropriate guidance from OSPAR, MARPOL and the IMO regarding minimising accidental pollution at sea. Further, this risk is minimised by a range of designed in measures, such as the development and adherence to an EMP, including a MPCP, and an appropriate CoCP during the construction phase. With adherence to these plans and guidance, significant impacts on harbour porpoise and accidental pollution that impacts thes species at a population level are considered to be very unlikely. Overall, it is considered that there is no potential for LSE on the harbour porpoise feature of any transboundary site from this impact.

k: **In-combination effects –** over the distances considered (minimum 234.54 km from the site boundary) all relevant effect-pathways are considered extremely weak, such that only a negligible (if even detectable) influence would be apparent. Such effects could not contribute to any material degree to an in-combination effect and as such, in-combination effects associated with planned projects or other activities in the vicinity of the site boundary are also not anticipated for the harbour porpoise feature of any transboundary sites.

5.4. ASSESSMENT OF LSE FOR ANNEX I MARINE ORNITHOLOGICAL FEATURES

5.4.1. PATHWAYS FOR LSE: POTENTIAL IMPACTS ON ANNEX I MARINE ORNITHOLOGICAL FEATURES

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

264. Consideration of the potential impacts identified for the marine ornithological features is presented in the following sections to inform the determination of LSE. Many of the European sites screened in include an assemblage qualifying feature, with the named components of each of these assemblage features also being identified in Table 5.4. For the purposes of considering the potential impacts, these named components are treated as qualifying features (with the potential impacts also considered for the overall assemblage feature).

Construction phase

Temporary direct habitat loss

265. There is potential for temporary direct habitat loss and disturbance during construction operations (e.g. cable laying and seabed preparation). This impact, however, is restricted to within the footprint of the Array and as illustrated in Figure 4.1, there is no spatial overlap between the Array and any European sites designated for Annex II seabird species. On this basis, there is no potential for direct impacts to supporting habitats for Annex II seabird species within any European site.

266. There is potential for Annex II seabirds to be present in the waters in and around the Array and therefore be affected by temporary habitat loss/disturbance (e.g. effects on feeding grounds) during foraging and migration. However, considering the highly mobile nature of Annex II seabird features and the small spatial extent of supporting habitats affected with the similar available habitats present across the wider North Sea, significant impacts on foraging and food availability are not predicted.

267. On this basis, there is no potential for LSE on any seabird qualifying interest features of European sites as a result of temporary direct habitat loss during the construction phase, and this impact is screened out from further consideration for all European sites.

Disturbance and displacement

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

269. The presence of vessels and construction works may disturb seabirds from offshore foraging or roosting areas in the short term, causing changes in behaviour or displacing them from the affected areas. Temporary disturbance/displacement may lead to a reduction in foraging opportunities or increased energy expenditure, resulting in decreased survival rates or productivity in the population. This would only be likely to apply to seabirds which use the area of the marine environment in which construction activities will occur. The effects of such displacement are likely to be minimal for species such as gannet and fulmar (irrespective of their sensitivity to the effect), which have particularly large foraging ranges, because the resultant habitat loss will represent a small proportion of the available habitat.

270. However, based on NatureScot (2021) and MSS (2021) advice (which in part results from the increasing number of offshore wind farms, with implications for the in-combination effects), the potential for LSE due to the displacement of gannets during the breeding and non-breeding season will be considered. Guillemot and razorbill will be considered for both breeding and non-breeding season effects, but, for puffin, effects are considered to be limited to the breeding season, as advised by NatureScot (2021)). For kittiwake, it is also considered that displacement is likely to lead to effects in the breeding season only (Royal HaskoningDHV, 2021).

271. Migratory waterbird species would not be significantly affected when passing through (or over) the Array on migration (as they are not expected to forage or rest in the marine environment around the Array).

272. It is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the puffin, guillemot, razorbill, kittiwake, and seabird assemblage qualifying features.

Changes to prey availability

273. Indirect impacts on seabirds may occur as a result of changes in prey distribution, availability or abundance, caused by construction activities that disturb the seabed (and cause increased Suspended Sediment Concentrations SSCs) or increase subsea noise levels. Reduction or disruption to prey availability to seabirds may cause displacement from foraging grounds in the area or reduced energy intake, affecting survival rates or productivity in the population in the short-term. As above, migratory waterbird species would not be significantly affected when passing through (or over) the Array on migration (as they are not expected to forage or rest in the marine environment around the Array).

274. The potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species and this impact cannot be screened out. The only exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species.

Accidental pollution

275. In line with advice from NatureScot (2021) and MSS (2021) in relation to Berwick Bank Offshore Wind Farm, accidental pollution associated with construction activities is not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for management and contingency plans.

276. On this basis, there is no potential for LSE on any seabird qualifying interest features of European sites as a result of accidental pollution during the construction phase, and this impact is screened out from further consideration for all European sites.

Operation and maintenance phase

Direct habitat loss

277. Direct habitat loss may occur during the operation and maintenance phase of the Array. Given the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting), direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations. Similarly, no effects are predicted on migratory waterbird populations as a result of birds passing through (or over) the Array on migration.

278. On this basis, there is no potential for LSE on any seabird qualifying interest features of European sites as a result of direct habitat loss during the operation and maintenance phase, and this impact is screened out from further consideration for all European sites.

Disturbance and displacement

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

280. The presence of operational wind turbines, as well as the associated maintenance activities, may disturb seabirds and displace them from foraging or roosting areas over the long-term. This may lead to a reduction in foraging opportunities or increased competition and energy expenditure, resulting in decreased survival rates or productivity in the population. Such effects may be most likely in relation to seabirds using the marine habitats within the Array, although species are known to vary in their sensitivity to displacement (e.g. large gull species show little evidence of displacement from offshore wind farms whereas gannet and red-throated diver show marked displacement - Dierschke *et al*., 2018, Dorsch *et al*., 2020). The effects of such displacement are likely to be minimal for species such as gannet and fulmar (irrespective of their sensitivity to the effect), which have particularly large foraging ranges, because the resultant habitat loss will represent a small proportion of the available habitat.

281. However, based on NatureScot (2021) and MSS (2021) advice (which in part results from the increasing number of offshore wind farms, with implications for the in-combination effects), the potential for LSE due to the displacement of gannets during the breeding and non-breeding season will be considered. Guillemot and razorbill will be considered for both breeding and non-breeding season effects, but, for puffin, effects are considered to be limited to the breeding season, as advised by NatureScot (2021). For kittiwake, it is also considered that displacement is likely to lead to effects in the breeding season only (Royal HaskoningDHV, 2021).

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

Collision risk

283. Collisions of seabirds and/or migratory waterbirds with the rotating blades of the wind turbines may result in the death or injury of individuals. Such mortality may be additive, so could cause population declines or, in some situations, prevent population recovery. Therefore, seabird species which forage within, or commute through, the Array may be vulnerable to such effects, as is also the case for migratory waterbirds which transit this area on migration. For seabirds, collision risk may vary between species in relation to a range of factors associated with flight behaviour but with flight heights being of fundamental importance in predicting the vulnerability to this effect (Johnston *et al*., 2014a,b). Thus, species which fly at low heights and below the rotor swept area (e.g. fulmar and auk species) are not vulnerable to this effect pathway, in contrast to other species which generally fly at greater heights and are at risk of collision for a proportion of their flight time (e.g. kittiwake, large gull species and gannet). Given the offshore location of the Array, it is extremely unlikely that any of the migratory waterbird species associated with European sites would make more frequent movements across the Array (e.g. when commuting between foraging and roosting sites), and it is considered that collision risk for these species is limited to their migratory movements. The evidence used to identify species susceptible to collision is presented in Table 5.4 to Table 5.51.

284. There is potential for LSE in relation to collision to certain seabird species as a result of the presence of the Array, therefore, this impact is screened into the assessment.

Barrier to movement

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

286. Guillemot, razorbill, puffin, gannet, and kittiwake may be affected by barrier effects from the Array. Other species such as herring gull and great black-backed gull are considered to be relatively insensitive to such effects, whilst the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species.

287. The potential for barrier effects on gannet, guillemot and razorbill is considered for both the breeding and non-breeding seasons, whilst for puffin, it is considered to be limited to the breeding season (following NatureScot, 2021). It is considered that potential impacts of barrier effects on kittiwake populations is limited to the breeding season (Royal HaskoningDHV, 2021).

288. The potential for LSE cannot be excluded in relation to barrier effects on certain seabird species as a result of the presence of the Array, and this impact is, therefore, screened into the assessment.

Changes to prey availability

289. Indirect impacts on seabirds may occur as a result of changes in prey distribution, availability or abundance in the marine environment due to the presence of offshore infrastructure, and as a result of operation and maintenance activities that disturb the seabed (and cause increased SSCs) or increase subsea noise levels. In comparison to construction, however, subsea noise levels will be significantly lower in the operation and maintenance phase (e.g. there will be no piling), therefore, the potential for adverse effects on prey species as a result is greatly reduced. Similarly, seabed disturbance and associated increased SSCs will also be substantially lower in the operation and maintenance phase, namely occurring during cable or foundation maintenance activities.

290. Migratory waterbird species would not be significantly affected when passing through (or over) the Array on migration (as they are not expected to forage or rest in the marine environment around the Array).

291. On this basis, there is no potential for LSE on any seabird qualifying interest features of any European sites as a result of changes in prey availability during the operation and maintenance phase, and this impact is screened out from further consideration for all European sites.

Entanglement

292. With the advent of floating offshore wind, the potential for entanglement of diving seabirds with floating foundations has been raised. Currently there is no clear guidance on the assessment approaches required for bird entanglement. A short review of published reports from similar floating offshore wind farm projects and other moored infrastructures does not provide examples of where entanglement for seabirds has been screened in for assessment. This is most likely due to this potential impact being an incredibly rare occurrence (SEER, 2022).

293. Primary entanglement risk is thought to be unlikely due to the design parameters, with the mooring lines being under tension and the dimensions of the chain reducing the likelihood of full or partial entanglement to be highly unlikely (SEER, 2022).

294. Offshore infrastructure may act as hard substrate leading to likely habitat development, acting as a fish aggregation device (FAD), providing refuge for prey species increasing attraction factors within the Array and may increase entanglement risk. While possible in theory, best available evidence from the Pentland Floating Offshore Windfarm indicates that the level of fish aggregation around floating wind turbine designs is minimal and therefore decreases the likelihood of increased prey fish densities influencing entanglement.

295. Secondary entanglement risk could arise from fishing gear caught on the mooring lines. Maintenance and monitoring practices of the deployed infrastructure are proposed to decrease this risk, such as that proposed for Kincardine Offshore Wind Farm which will use Remotely Operated Vehicles (ROVs) and vessel-mounted sensors (such as multibeam sonar) to periodically survey floating cable systems, which could also monitor for

the presence of derelict fishing gear (SEER, 2022). Such mitigation would help reduce the potential likelihood of any entanglement.

296. Whilst entanglement is a rare occurrence and can be mitigated as outlined above, it remains a possibility for diving species and the potential for LSE cannot be excluded. Entanglement is therefore screened in for assessment.

Accidental pollution

297. As per the construction phase, accidental pollution is not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans (NatureScot, 2021, MSS, 2021).

298. On this basis, there is no potential for LSE on any seabird qualifying interest features of European sites as a result of accidental pollution during the construction phase, and this impact is screened out from further consideration for all European sites.

Decommissioning phase

299. The impacts during the decommissioning phase are considered to be similar and potentially less than those outlined above for the construction phase. The impacts of direct habitat loss, collision and barriers to movement are not applicable to the decommissioning phase and, therefore, have been greyed out in Table 5.4 to Table 5.51.

5.4.2. DETERMINATION OF LSE FOR ANNEX I MARINE ORNITHOLOGICAL FEATURES

300. Table 5.4 to Table 5.51 present the conclusions in relation to the determination of LSE as a result of the Array. Separate LSE screening tables are presented for each of the 46 European sites which are taken forward for determination of LSE on the basis of the information and analysis in section 4.4 (and which are listed in Table 4.7). The European Sites are listed in the same order as in Table 4.7, the breeding seabird colony SPAs in Table 5.4 to Table 5.32 and the migratory waterbird SPAs in Table 5.35 to Table 5.51. The conclusion on whether LSE can be excluded or not is presented for each of the qualifying features screened in for each of these 46 sites in relation to each effect pathway.

301. The footnotes to these tables briefly outline the rationale for the conclusion in relation to LSE for each qualifying feature. Effects that are not applicable to a particular feature are greyed out.

Table 5.4: LSE Matrix for Marine Ornithological Features of the Fowlsheugh SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – guillemot, razorbill and kittiwake from this SPA may be affected by disturbance and displacement from the Array and its surrounds. Herring gull is considered to be relatively insensitive to such effects, whilst the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only, whilst for the two auk species the effect pathway is considered relevant to both the breeding and non-breeding seasons (Royal HaskoningDHV, 2021; NatureScot, 2021; MSS, 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, razorbill, kittiwake and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – guillemot, razorbill and kittiwake from this SPA may be affected by barrier effects from the Array. Herring gull is considered to be relatively insensitive to such effects, whilst the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only, whilst for the two auk species the effect pathway is considered relevant to both the breeding and non-breeding seasons (Royal HaskoningDHV, 2021; NatureScot, 2021; MSS, 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, razorbill, kittiwake, and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices. However, effects cannot be excluded for diving seabird species that may be foraging in the array area, therefore it is considered there is potential for LSE for guillemot and razorbill.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.5: LSE Matrix for Marine Ornithological Features of the Buchan Ness to Collieston Coast SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – guillemot and kittiwake from this SPA may be affected by disturbance and displacement from the Array and its surrounds. The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. Herring gull are considered to be relatively insensitive to such effects. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only, whilst for guillemot the effect pathway is considered relevant to both the breeding and non-breeding seasons (Royal HaskoningDHV, 2021; NatureScot, 2021; MSS, 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, kittiwake, and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – guillemot and kittiwake from this SPA may be affected by barrier effects from the Array. The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. Herring gull are considered to be relatively insensitive to such effects The potential for barrier effects on kittiwake is likely to be limited to the breeding season only, whilst for guillemot the effect pathway is considered relevant to both the breeding and non-breeding seasons (Royal HaskoningDHV, 2021; NatureScot, 2021; MSS, 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices. However, effects cannot be excluded for diving seabird species that may be foraging in the array area, therefore it is considered there is potential for LSE for guillemot.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.6: LSE Matrix for Marine Ornithological Features of the Farne Islands SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – guillemot, puffin and kittiwake from this SPA may be affected by disturbance and displacement from the Array and its surrounds. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only, whilst for the two auk species the effect pathway is considered relevant to both the breeding and non-breeding seasons (Royal HaskoningDHV, 2021; NatureScot, 2021; MSS, 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, puffin, kittiwake and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – guillemot, puffin and kittiwake from this SPA may be affected by barrier effects from the Array. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only, whilst for the two auk species the effect pathway is considered relevant to both the breeding and non-breeding seasons (Royal HaskoningDHV, 2021; NatureScot, 2021; MSS, 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, puffin, kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices. However, effects cannot be excluded for diving seabird species that may be foraging in the array area, therefore it is considered there is potential for LSE for guillemot and puffin.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.7: LSE Matrix for Marine Ornithological Features of the St Abb's Head to Fast Castle SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – guillemot, razorbill and kittiwake from this SPA may be affected by disturbance and displacement from the Array and its surrounds. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only, whilst for the two auk species the effect pathway is considered relevant to both the breeding and non-breeding seasons (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, razorbill, kittiwake, and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – guillemot, razorbill and kittiwake from this SPA may be affected by barrier effects from the Array. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only, whilst for the two auk species the effect pathway is considered relevant to both the breeding and non-breeding seasons (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, razorbill, kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices. However, effects cannot be excluded for diving seabird species that may be foraging in the array area, therefore it is considered there is potential for LSE for guillemot and razorbill.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.8: LSE Matrix for Marine Ornithological Features of the Forth Islands SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Gannet (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	×e	✓e		✓f		×g	×g		✓h	✓h	✓h
Guillemot (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	×e	✓e		✓f		×g	×g		✓h	✓h	✓h
Puffin (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	×e	✓e		✓f		×g	×g		✓h	✓h	✓h
Razorbill (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	×e	✓e		✓f		×g	×g		✓h	✓h	✓h
Kittiwake (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	×e	✓e		×f		×g	×g		✓h	✓h	✓h
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	×e	✓e		✓f		×g	×g		✓h	✓h	✓h

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – guillemot, razorbill, puffin, gannet, and kittiwake from this SPA may be affected by disturbance and displacement from the Array and its surrounds. For kittiwake and puffin, the consideration of displacement effects is limited to the breeding season only, whilst for gannet, guillemot and razorbill the effect pathway is considered relevant to both the breeding and non-breeding seasons (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, razorbill, puffin, gannet, kittiwake and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – guillemot, razorbill, puffin, gannet, and kittiwake from this SPA may be affected by barrier effects from the Array. For kittiwake and puffin the consideration of barrier effects is limited to the breeding season only, whilst for gannet, guillemot and razorbill the effect pathway is considered relevant to both the breeding and non-breeding seasons (Royal HaskoningDHV 2021; NaureScot 2021; MSS 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, razorbill, puffin, gannet, kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices. However, effects cannot be excluded for diving seabird species that may be foraging in the array area, therefore it is considered there is potential for LSE for gannet, puffin, guillemot, and razorbill.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.9: LSE Matrix for Marine Ornithological Features of the Troup, Pennan and Lion's Heads SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – guillemot, razorbill and kittiwake from this SPA may be affected by disturbance and displacement from the Array and its surrounds. The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only, whilst for the two auk species the effect pathway is considered relevant to both the breeding and non-breeding seasons (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, razorbill, kittiwake and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – guillemot, razorbill and kittiwake from this SPA may be affected by barrier effects from the Array. The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only, whilst for the two auk species the effect pathway is considered relevant to both the breeding and non-breeding seasons (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the guillemot, razorbill, kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices. However, effects cannot be excluded for diving seabird species that may be foraging in the array area, therefore it is considered there is potential for LSE for guillemot and razorbill.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.10: LSE Matrix for Marine Ornithological Features of the Coquet Island SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; P = Potential for LSE, O = No Potential for LSE)

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

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – puffin and kittiwake from this SPA may be affected by disturbance and displacement from the Array and its surrounds. The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. For kittiwake and puffin the consideration of displacement effects is limited to the breeding season only (Royal HaskoningDHV 2021; NatureScot 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the puffin, kittiwake, and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – puffin and kittiwake from this SPA may be affected by barrier effects from the Array. The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. For kittiwake and puffin, the consideration of displacement effects is limited to the breeding season only (Royal HaskoningDHV 2021; NatureScot 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the puffin, kittiwake, and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices. However, effects cannot be excluded for diving seabird species that may be foraging in the array area, therefore it is considered there is potential for LSE for guillemot and razorbill.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.11: LSE Matrix for Marine Ornithological Features of the East Caithness Cliffs SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e		×f		×g	×g		×h	×h	×h
Kittiwake (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	×e	✓e		×f		×g	×g		✓h	✓h	✓h
Razorbill (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	×e	✓e		✓f		×g	×g		✓h	✓h	✓h
Great black-backed gull (breeding)	×a	×a		×b	×b	×b		✓c			×d		✓e	×e	✓e		×f		×g	×g		✓h	✓h	✓h
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	×e	✓e		✓f		×g	×g		✓h	✓h	✓h

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – kittiwake and razorbill from this SPA may be affected by disturbance and displacement from the Array and its surrounds. The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal, whilst great black-backed gull is is considered to be relatively insensitive to such effects. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only, whilst for razorbill they are considered relevant to both the breeding and non-breeding periods (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). However, for this SPA, connectivity of the razorbill population with the Array is limited to the non-breeding periods. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake, razorbill and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – kittiwake and razorbill from this SPA may be affected by barrier effects from the Array. The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species, whilst great black-backed gull is considered to be relatively insensitive to such effects. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only, whilst for razorbill it is considered relevant to both the breeding and non-breeding periods (Royal HaskoningDHV 2021; NautreScot 2021; MSS 2021). However, for this SPA, connectivity of the razorbill population with the Array is limited to the non-breeding periods. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake, razorbill and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices. However, effects cannot be excluded for diving seabird species that may be foraging in the array area, therefore it is considered there is potential for LSE for razorbill.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.12: LSE Matrix for Marine Ornithological Features of the Copinsay SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e		×f		×g	×g		×h	×h	×h
Kittiwake (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	×e	✓e		×f		×g	×g		✓h	✓h	✓h
Great black-backed gull (breeding)	×a	×a		×b	×b	×b		✓c			×d		✓e	×e	✓e		×f		×g	×g		✓h	✓h	✓h
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	×e	✓e		×f		×g	×g		✓h	✓h	✓h

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – kittiwake from this SPA may be affected by disturbance and displacement from the Array and its surrounds. The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal, whilst great black-backed gull is considered to be relatively insensitive to such effects. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only (Royal HaskoningDHV 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – kittiwake from this SPA may be affected by barrier effects from the Array. The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species, whilst great black-backed gull is considered to be relatively insensitive to such effects. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only (Royal HaskoningDHV 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices..

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.13: LSE Matrix for Marine Ornithological Features of the Flamborough and Filey Coast SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e		×f		×g	×g		×h	×h	×h
Gannet (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	×e	✓e		✓f		×g	×g		✓h	✓h	✓h
Kittiwake (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	×e	✓e		×f		×g	×g		✓h	✓h	✓h
Razorbill (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	×e	✓e		✓f		×g	×g		✓h	✓h	✓h
Puffin (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	×e	✓e		✓f		×g	×g		✓h	✓h	✓h
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	×e	✓e		✓f		×g	×g		✓h	✓h	✓h

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – razorbill, puffin, gannet and kittiwake from this SPA may be affected by disturbance and displacement from the Array and its surrounds. The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. For kittiwake and puffin the consideration of displacement effects is limited to the breeding season only, whilst for gannet and razorbill the effect pathway is considered relevant to both the breeding and non-breeding seasons (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). However, for this SPA, connectivity of the razorbill population with the Array is limited to the non-breeding periods. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the razorbill, puffin, gannet, kittiwake, and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – razorbill, puffin, gannet and kittiwake from this SPA may be affected by barrier effects from the Array. The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. For kittiwake and puffin, the consideration of barrier effects is limited to the breeding season only, whilst for gannet and razorbill the effect pathway is considered relevant to both the breeding and non-breeding seasons (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). However, for this SPA, connectivity of the razorbill population with the Array is limited to the non-breeding periods. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the razorbill, puffin, gannet, kittiwake, and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices. However, effects cannot be excluded for diving seabird species that may be foraging in the array area, therefore it is considered there is potential for LSE for gannet, razorbill, and puffin.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.14: LSE Matrix for Marine Ornithological Features of the Rousay SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – kittiwake from this SPA may be affected by disturbance and displacement from the Array and its surrounds. The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only (Royal HaskoningDHV 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – kittiwake from this SPA may be affected by barrier effects from the Array. The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. The potential for barrier on kittiwake is likely to be limited to the breeding season only (Royal HaskoningDHV 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.15: LSE Matrix for Marine Ornithological Features of the Marwick Head SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – kittiwake from this SPA may be affected by disturbance and displacement from the Array and its surrounds. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only (Royal HaskoningDHV 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – kittiwake from this SPA may be affected by barrier effects from the Array. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only (Royal HaskoningDHV 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.16: LSE Matrix for Marine Ornithological Features of the Fair Isle SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – gannet and kittiwake from this SPA may be affected by disturbance and displacement from the Array and its surrounds. For kittiwake displacement effects are likely to be limited to the breeding season only, whilst for gannet they are considered relevant to both the breeding and non-breeding periods (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet, kittiwake and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – gannet and kittiwake from this SPA may be affected by barrier effects from the Array. For kittiwake barrier effects are likely to be limited to the breeding season only, whilst for gannet they are considered relevant to both the breeding and non-breeding periods (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet, kittiwake, and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices. However, effects cannot be excluded for diving seabird species that may be foraging in the array area, therefore it is considered there is potential LSE for gannet.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.17: LSE Matrix for Marine Ornithological Features of the West Westray SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – kittiwake from this SPA may be affected by disturbance and displacement from the Array and its surrounds. The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only (Royal HaskoningDHV 2021)). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – kittiwake from this SPA may be affected by barrier effects from the Array. The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only (Royal HaskoningDHV 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.18: LSE Matrix for Marine Ornithological Features of the Calf of Eday SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e		×f		×g	×g		×h	×h	×h
Kittiwake (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	×e	✓e		×f		×g	×g		✓h	✓h	✓h
Great black-backed gull (breeding)	×a	×a		×b	×b	×b		✓c			×d		✓e	×e	✓e		×f		×g	×g		✓h	✓h	✓h
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	×e	✓e		×f		×g	×g		✓h	✓h	✓h

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – kittiwake from this SPA may be affected by disturbance and displacement from the Array and its surrounds. The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal, whilst great black-backed gull are considered to be relatively insensitive to such effects. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only (Royal HaskoningDHV 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – kittiwake from this SPA may be affected by barrier effects from the Array. The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species, whilst great black-backed gull are considered to be relatively insensitive to such effects. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only (Royal HaskoningDHV 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.19: LSE Matrix for Marine Ornithological Features of the Sumburgh Head SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e		×f		×g	×g		×h	×h	×h
Seabird assemblage (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e		×f		×g	×g		×h	×h	×h

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

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

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

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

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.20: LSE Matrix for Marine Ornithological Features of the North Caithness Cliffs SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – kittiwake and razorbill from this SPA may be affected by disturbance and displacement from the Array and its surrounds. The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only, whilst for razorbill the effect pathway is considered relevant to both the breeding and non-breeding seasons (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). However, for this SPA, connectivity of the razorbill population with the Array is limited to the non-breeding periods. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake, razorbill and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – kittiwake and razorbill from this SPA may be affected by barrier effects from the Array. The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only, whilst for razorbill the effect pathway is considered relevant to both the breeding and non-breeding seasons (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). However, for this SPA, connectivity of the razorbill population with the Array is limited to the non-breeding periods. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake, razorbill, and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices. However, effects cannot be excluded for diving seabird species that may be foraging in the array area, therefore it is considered there is potential LSE for razorbill.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.21: LSE Matrix for Marine Ornithological Features of the Noss SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – gannet from this SPA may be affected by disturbance and displacement from the Array and its surrounds. For gannet displacement effects are considered relevant to both the breeding and non-breeding periods (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – gannet from this SPA may be affected by barrier effects from the Array. For gannet barrier effects are considered relevant to both the breeding and non-breeding periods (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices. However, effects cannot be excluded for diving seabird species that may be foraging in the array area, therefore it is considered there is potential LSE for gannet.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.22: LSE Matrix for Marine Ornithological Features of the Hoy SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – kittiwake from this SPA may be affected by disturbance and displacement from the Array and its surrounds. The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. The potential effects of disturbance and displacement on kittiwake are likely to be limited to the breeding season only (Royal HaskoningDHV 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – kittiwake from this SPA may be affected by barrier effects from the Array. The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. The potential for barrier effects on kittiwake is likely to be limited to the breeding season only (Royal HaskoningDHV 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the kittiwake, and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.23: LSE Matrix for Marine Ornithological Features of the Foula SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e		×f		×g	×g		×h	×h	×h
Seabird assemblage (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e		×f		×g	×g		×h	×h	×h

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

c. Collision – fulmar generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

d: Barrier to movement – the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.24: LSE Matrix for Marine Ornithological Features of the North Rona and Sula Sgeir SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – gannet from this SPA may be affected by disturbance and displacement from the Array and its surrounds. For gannet displacement effects are considered to be relevant to both the breeding and non-breeding periods (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – gannet from this SPA may be affected by barrier effects from the Array. For gannet barrier effects are considered to be relevant to both the breeding and non-breeding periods (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices. However, effects cannot be excluded for diving seabird species that may be foraging in the array area, therefore it is considered there is potential LSE for gannet.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.25: LSE Matrix for Marine Ornithological Features of the Fetlar SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e		×f		×g	×g		×h	×h	×h
Seabird assemblage (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e		×f		×g	×g		×h	×h	×h

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

c. Collision – fulmar generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

d: Barrier to movement – the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.26: LSE Matrix for Marine Ornithological Features of the Sule Skerry and Sule Stack SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Gannet (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	×e	✓e		✓f		×g	×g		✓h	✓h	✓h
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		✓c			✓d		✓e	×e	✓e		✓f		×g	×g		✓h	✓h	✓h

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – gannet from this SPA may be affected by disturbance and displacement from the Array and its surrounds. For gannet displacement effects are considered to be relevant to both the breeding and non-breeding periods (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – gannet from this SPA may be affected by barrier effects from the Array. For gannet barrier effects are considered to be relevant to both the breeding and non-breeding periods (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices. However, effects cannot be excluded for diving seabird species that may be foraging in the array area, therefore it is considered there is potential LSE for gannet.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.27: LSE Matrix for Marine Ornithological Features of the Hermaness, Saxa Vord and Valla Field SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – gannet from this SPA may be affected by disturbance and displacement from the Array and its surrounds. For gannet displacement effects are considered to be relevant to both the breeding and non-breeding periods (Royal HaskoningDHV 2021; NatureScot 2021, MSS 2021). The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – gannet from this SPA may be affected by barrier effects from the Array. For gannet barrier effects are considered to be relevant to both the breeding and non-breeding periods (Royal HaskoningDHV 2021, NS 2021, MSS 2021). The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices. However, effects cannot be excluded for diving seabird species that may be foraging in the array area, therefore it is considered there is potential LSE for gannet.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.28: LSE Matrix for Marine Ornithological Features of the Cape Wrath SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e		×f		×g	×g		×h	×h	×h
Seabird assemblage (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e		×f		×g	×g		×h	×h	×h

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

c. Collision – fulmar generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

d: Barrier to movement – the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.29: LSE Matrix for Marine Ornithological Features of the Handa SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e		×f		×g	×g		×h	×h	×h
Seabird assemblage (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e		×f		×g	×g		×h	×h	×h

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

c. Collision – fulmar generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

d: Barrier to movement – the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.30: LSE Matrix for Marine Ornithological Features of the Shiant Isles (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e		×f		×g	×g		×h	×h	×h
Seabird assemblage (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e		×f		×g	×g		×h	×h	×h

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

c. Collision – fulmar generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

d: Barrier to movement – the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.31: LSE Matrix for Marine Ornithological Features of the Flannan Isles SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Fulmar (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e		×f		×g	×g		×h	×h	×h
Seabird assemblage (breeding)	×a	×a		×b	×b	×b		×c			×d		×e	×e	×e		×f		×g	×g		×h	×h	×h

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – the particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

c. Collision – fulmar generally fly below the lower rotor swept height and are not considered vulnerable to collision effects. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

d: Barrier to movement – the particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.32: LSE Matrix for Marine Ornithological Features of the St Kilda SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g. roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – gannet from this SPA may be affected by disturbance and displacement from the Array and its surrounds. For gannet displacement effects are considered to be relevant to both the breeding and non-breeding periods (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). The particularly large foraging range of fulmar means that any effects of disturbance within, or displacement from, the Array are likely to be minimal. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – gannet from this SPA may be affected by barrier effects from the Array. For gannet barrier effects are considered to be relevant to both the breeding and non-breeding periods (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021). The particularly large foraging range of fulmar means that the consequences of barrier effects resulting from the Array are likely to be minimal on this species. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the gannet and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices. However, effects cannot be excluded for diving seabird species that may be foraging in the array area, therefore it is considered there is potential LSE for gannet.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.33: LSE Matrix for Marine Ornithological Features of the Mingulay to Berneray SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Razorbill (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	×e	✓e		✓f		×g	×g		✓h	✓h	✓h
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	×e	✓e		✓f		×g	×g		✓h	✓h	✓h

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g., roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – razorbill from this SPA may be affected by disturbance and displacement from the Array and its surrounds. For razorbill displacement effects are considered to be relevant to both the breeding and non-breeding periods (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021), although for this SPA connectivity with the Array is limited to the non-breeding periods. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the razorbill and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – razorbill from this SPA may be affected by barrier effects from the Array. For razorbill, barrier effects are considered to be relevant to both the breeding and non-breeding periods (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021), although for this SPA connectivity with the Array is limited to the non-breeding periods. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the razorbill and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices. However, effects cannot be excluded for diving seabird species that may be foraging in the array area, therefore it is considered there is potential LSE for razorbill.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.34: LSE Matrix for Marine Ornithological Features of the Rathlin Island SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Razorbill (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	×e	✓e		✓f		×g	×g		✓h	✓h	✓h
Seabird assemblage (breeding)	×a	×a		✓b	✓b	✓b		×c			✓d		✓e	×e	✓e		✓f		×g	×g		✓h	✓h	✓h

a: Direct habitat loss – as detailed in section 5.4.1, direct habitat loss due to the Array is unlikely to have effects on SPA breeding seabird populations due to the large foraging ranges used by seabirds and the extent of marine habitats available for other functions (e.g., roosting). Also, direct habitat loss during the construction period is a temporary and relatively short-term effect. Therefore, it is considered that there is no potential for LSE in relation to this effect pathway for this SPA.

b: Disturbance and displacement – razorbill from this SPA may be affected by disturbance and displacement from the Array and its surrounds. For razorbill displacement effects are considered to be relevant to both the breeding and non-breeding periods (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021), although for this SPA connectivity with the Array is limited to the non-breeding periods. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the razorbill and seabird assemblage qualifying features of this SPA.

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

d: Barrier to movement – razorbill from this SPA may be affected by barrier effects from the Array. For razorbill, barrier effects are considered to be relevant to both the breeding and non-breeding periods (Royal HaskoningDHV 2021; NatureScot 2021; MSS 2021), although for this SPA connectivity with the Array is limited to the non-breeding periods. Therefore, it is considered that the potential for LSE in relation to this effect pathway cannot be excluded for the razorbill and seabird assemblage qualifying features of this SPA.

e: Changes in prey availability – as detailed in section 5.4.1 above, the potential for LSE cannot be excluded in relation to indirect effects resulting from effects on the availability or abundance of prey species during the construction phase. The exception in this regard is fulmar, for which this effect pathway is unlikely to be important because of the particularly large foraging range of the species. During O&M, subsea noise and seabed disturbance will be significantly lower and there will be no LSE for any seabird species.

f: Entanglement – As detailed in section 5.4.1, entanglement due to the Array is unlikely to have effects on the majority of breeding seabird populations due to the design parameters, minimal evidence of fish aggregation around floating infrastructure, and embedded mitigation to avoid entanglement with fishing devices. However, effects cannot be excluded for diving seabird species that may be foraging in the array area, therefore it is considered there is potential LSE for razorbill.

g: Accidental pollution - As detailed in section 5.4.1, accidental pollution not considered as an impact pathway because this will be subject to other regulatory control through both legislation and the requirements for contingency plans.

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

Table 5.35: LSE Matrix for Marine Ornithological Features of the Ythan Estuary, Sands of Forvie and Meikle Loch SPA / Ythan Estuary and Meikle Loch Ramsar site (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

As detailed in section 5.4.1 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (h) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.36: LSE Matrix for Marine Ornithological Features of the Montrose Basin SPA and Ramsar site (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

As detailed in section 5.4.1 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (h) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.37: LSE Matrix for Marine Ornithological Features of the Firth of Tay and Eden Estuary SPA and Ramsar site (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			In-combination Effects			Entanglement			Accidental Pollution		
	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
Bar-tailed godwit (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f		×g		×h	×h	
Common Scoter (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f		×g		×h	×h	
Cormorant (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f		×g		×h	×h	
Dunlin (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f		×g		×h	×h	
Eider (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f		×g		×h	×h	
Goldeneye (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f		×g		×h	×h	
Goosander (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f		×g		×h	×h	
Grey plover (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f		×g		×h	×h	
Greylag goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f		×g		×h	×h	
Icelandic black-tailed godwit (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f		×g		×h	×h	
Long-tailed duck (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f		×g		×h	×h	
Oystercatcher (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f		×g		×h	×h	
Pink-footed goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f		×g		×h	×h	
Red-breasted merganser (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f		×g		×h	×h	
Redshank (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f		×g		×h	×h	
Sanderling (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e	✓f	✓f	✓f		×g		×h	×h	

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

As detailed in section 5.4.1 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.38: LSE Matrix for Marine Ornithological Features of the Lindisfarne SPA and Ramsar site (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Bar-tailed godwit (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Common scoter (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Dunlin (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Eider (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Golden plover (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Grey plover (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Greylag goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Light-bellied brent goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Long-tailed duck (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Red-breasted merganser (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Redshank (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Ringed plover (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Sanderling (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Shelduck (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Whooper swan (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Wigeon (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Waterfowl assemblage (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h

As detailed in section 5.4.1 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (h) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.39: LSE Matrix for Marine Ornithological Features of the Firth of Forth SPA and Ramsar site (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Bar-tailed godwit (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Common Scoter (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Cormorant (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Curlew (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Dunlin (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Eider (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Golden plover (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Goldeneye (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Great crested grebe (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Grey plover (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Knot (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Lapwing (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Long-tailed duck (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Mallard (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Oystercatcher (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Pink-footed goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Red-breasted merganser (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Red-throated diver (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Redshank (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Ringed plover (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Sandwich tern (passage)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Scaup (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Shelduck (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Slavonian grebe (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Turnstone (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Velvet scoter (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Wigeon (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Waterfowl assemblage (non-breeding)	×a	×a		✓b	×b	✓b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h

As detailed in section 5.4.1 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (h) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.40: LSE Matrix for Marine Ornithological Features of the Northumbria Coast SPA and Ramsar site (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Purple sandpiper (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Turnstone (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h

As detailed in section 5.4.1 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (h) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.41: LSE Matrix for Marine Ornithological Features of the Loch of Kinnordy SPA and Ramsar site (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

As detailed in section 5.4.1 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (h) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.42: LSE Matrix for Marine Ornithological Features of the Holburn Lake and Moss SPA and Ramsar site (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Greylag goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h

As detailed in section 5.4.1 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (h) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.43: LSE Matrix for Marine Ornithological Features of the Cameron Reservoir SPA and Ramsar site (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

As detailed in section 5.4.1 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (h) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.44: LSE Matrix for Marine Ornithological Features of the Greenlaw Moor SPA and Ramsar site (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Greylag goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h

As detailed in section 5.4.1 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (h) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.45: LSE Matrix for Marine Ornithological Features of the Din Moss - Hoselaw Loch SPA and Ramsar site (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

As detailed in section 5.4.1 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (h) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.46: LSE Matrix for Marine Ornithological Features of the Loch Leven SPA and Ramsar site (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE))

European Site Qualifying Feature	Direct Habitat Loss			Disturbance/ Displacement			Collision			Barrier to Movement			Changes in Prey Availability			Entanglement			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
Cormorant (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Gadwall (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Goldeneye (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Pink-footed goose (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Pochard (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Shoveler (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Teal (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Tufted duck (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Whooper swan (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h
Waterfowl assemblage (non-breeding)	×a	×a		×b	×b	×b		✓c			✓d		×e	×e	×e		×f		×g	×g		✓h	✓h	✓h

As detailed in section 5.4.1 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (f) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.47: LSE Matrix for Marine Ornithological Features of the Fala Flow SPA and Ramsar site (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

As detailed in section 5.4.1 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (h) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.48: LSE Matrix for Marine Ornithological Features of the South Tayside Goose Roosts SPA and Ramsar site (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

As detailed in section 5.4.1 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (h) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.49: LSE Matrix for Marine Ornithological Features of the Gladhouse Reservoir SPA and Ramsar site (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, ✗ = No Potential for LSE)

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

As detailed in section 5.4.1 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (h) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.50: LSE Matrix for Marine Ornithological Features of the Westwater SPA and Ramsar site (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, ✗ = No Potential for LSE)

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

As detailed in section 5.4.1 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (h) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

Table 5.51: LSE Matrix for Marine Ornithological Features of the Slamannan Plateau SPA (C = Construction, O&M = Operation and Maintenance, D = Decommissioning; ✓ = Potential for LSE, × = No Potential for LSE)

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

As detailed in section 5.4.1 above, for the migratory waterbird SPAs, collisions (c) and barrier to movement (d) (both of which are restricted to the operation and maintenance period) are the only effect pathways for which the potential for LSE cannot be excluded. As a consequence of the conclusions for these two effect pathways, it is also the case that the potential for LSE as a result of in-combination effects with other plans and projects (h) cannot be excluded. For all other effect pathways, it is considered that there is no potential for LSE.

6. SUMMARY OF LSE

302. 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 Array alone and/or in-combination with other plans or projects is presented in Table 6.1. These sites will be taken forward for consideration in the RIAA.

303. A total of 53 sites are being taken forward for consideration in the RIAA. Nine European sites designated for Annex II diadromous fish were assessed for LSE, and this report has found that all nine sites require further consideration in the RIAA due to potential LSEs from subsea noise and EMF and in-combination effects associated with these two impacts. In total 24 European sites designated for Annex II marine mammals were assessed for LSE (comprised of five UK SACs and 19 transboundary sites). Of these, three require further consideration in the RIAA due to potential LSEs from to subsea noise from piling and UXO clearance, changes in prey availability, operational noise from anchor mooring lines, entanglement, and in-combination effects associated with these impacts. The three marine mammals SACs comprised two SACs for grey seal, and one for harbour porpoise (Table 6.1). In relation to the SPAs (and associated Ramsar sites included on the basis of their ornithological features), the assessment of LSE undertaken in section 5.4 above, result in a total of 41 sites being taken forward for consideration in the RIAA. Of these 41 SPAs (and Ramsar sites), 24 are breeding seabird colony SPAs and 17 are migratory waterbird SPAs (and Ramsar sites) (Table 6.1).

Table 6.1: Summary of European Sites and Relevant Qualifying Features for which Potential LSEs have Been Identified and Screened in for Further Assessment in the RIAA (✓ = Potential for LSE during Project Phase, C = Construction, O = Operation and Maintenance, D= Decommissioning)

European Site	Distance to Site Boundary (km)	Relevant Qualifying Interest Feature(s)	Impact	Project Phase		
				C	O	D
Diadromous Fish and Shellfish						
River Dee SAC	80.57	Atlantic salmon and Freshwater pearl mussel	Subsea noise from piling	✓		
			EMF		✓	
			In-combination effects	✓	✓	
River South Esk SAC	107.13	Atlantic salmon and Freshwater pearl mussel	Subsea noise from piling	✓		
			EMF		✓	
			In-combination effects	✓	✓	
Tweed Estuary SAC	128.65	Sea lamprey	Subsea noise from piling	✓		
			EMF		✓	
			In-combination effects	✓	✓	
River Tweed SAC	133.40	Atlantic salmon and sea lamprey	Subsea noise from piling	✓		
			EMF		✓	
			In-combination effects	✓	✓	
River Tay	162.32	Atlantic salmon and sea lamprey	Subsea noise from piling	✓		
			EMF		✓	
			In-combination effects	✓	✓	
River Spey SAC	181.56	Atlantic salmon, Freshwater pearl mussel, and sea lamprey	Subsea noise from piling	✓		
			EMF		✓	
			In-combination effects	✓	✓	
Berriedale and Langwell Waters SAC	219.57	Atlantic salmon	Subsea noise from piling	✓		
			EMF		✓	
			In-combination effects	✓	✓	
River Teith SAC	244.19	Atlantic salmon Sea lamprey	Subsea noise from piling	✓		
			EMF		✓	
			In-combination effects	✓	✓	
River Oykel SAC	259.33	Atlantic salmon and Freshwater pearl mussel	Subsea noise from piling	✓		
			EMF		✓	
			In-combination effects	✓	✓	
Marine Mammals						
Berwickshire and North Northumberland Coast SAC	113.95	Grey seal	Subsea noise from piling	✓		
			Subsea noise from UXO clearance	✓		
			Changes in prey availability	✓		
			Entanglement		✓	
			Operational noise from anchor mooring lines		✓	
			In-combination effects	✓	✓	
Isle of May SAC	129.50	Grey seal	Subsea noise from piling	✓		
			Changes in prey availability	✓		
			Entanglement		✓	
			Operational noise from anchor mooring lines		✓	
			In-combination effects	✓	✓	
Southern North Sea SAC	129.86	Harbour porpoise	Subsea noise from piling	✓		
			Subsea noise from UXO clearance	✓		
			Changes in prey availability	✓		
			Entanglement		✓	
			Operational noise from anchor mooring lines		✓	
			In-combination effects	✓	✓	
Breeding Seabird Colonies						
Fowlsheugh SPA	81.3	Guillemot (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Barrier to movement		✓	
		Razorbill (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Barrier to movement		✓	
		Kittiwake (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	

European Site	Distance to Site Boundary (km)	Relevant Qualifying Interest Feature(s)	Impact	Project Phase		
				C	O	D
		Herring gull (breeding)	Changes in prey availability	✓	✓	✓
			Collision		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
Buchan Ness to Collieston Coast SPA	82.7	Guillemot (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Barrier to movement		✓	
		Kittiwake (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Herring gull	Changes in prey availability	✓	✓	✓
			Collision		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
Farne Islands SPA	120.9	Guillemot (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Barrier to movement		✓	
		Puffin (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Barrier to movement		✓	
		Kittiwake (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
St Abb's Head to Fast Castle SPA	125.5	Guillemot (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Barrier to movement		✓	
		Razorbill	Disturbance / displacement	✓	✓	✓
		(breeding)	Changes in prey availability		✓	
			Barrier to movement		✓	
Forth Islands SPA	126.3	Herring gull (breeding)	Changes in prey availability	✓	✓	✓
			Collision		✓	
		Kittiwake (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Gannet (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Guillemot (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Barrier to movement		✓	
		Puffin (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Barrier to movement		✓	
		Razorbil (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Barrier to movement		✓	
		Kittiwake (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
Troup, Pennan and Lion's Heads SPA	120.6	Guillemot (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Barrier to movement		✓	
		Razorbil (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓

European Site	Distance to Site Boundary (km)	Relevant Qualifying Interest Feature(s)	Impact	Project Phase		
				C	O	D
			Barrier to movement		✓	
		Kittiwake (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
Coquet Island SPA	147.6	Kittiwake (breeding)	Barrier to movement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Puffin (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
East Caithness Cliffs SPA	211.8	Kittiwake (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
		Razorbil (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Barrier to movement		✓	
		Great black-backed gull (breeding)	Changes in prey availability	✓	✓	✓
			Collision		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
Copinsay SPA	245.4	Kittiwake (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Great black-backed gull (breeding)	Changes in prey availability	✓	✓	✓
			Collision		✓	

European Site	Distance to Site Boundary (km)	Relevant Qualifying Interest Feature(s)	Impact	Project Phase		
				C	O	D
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
Flamborough and Filey Coast SPA	248.5	Gannet (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Kittiwake (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Razorbill (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Barrier to movement		✓	
		Puffin (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
Rousay SPA	282.7	Kittiwake (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
Marwick Head SPA	287.3	Kittiwake (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	

European Site	Distance to Site Boundary (km)	Relevant Qualifying Interest Feature(s)	Impact	Project Phase		
				C	O	D
			Barrier to movement		✓	
Fair Isle SPA	291.5	Gannet (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Kittiwake (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
West Westray SPA	293	Kittiwake (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
Calf of Eday SPA	280.9	Kittiwake (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Great black-backed gull (breeding)	Changes in prey availability	✓	✓	✓
			Collision		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
North Caithness Cliffs SPA	229.1	Kittiwake (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
		Razorbill (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓

European Site	Distance to Site Boundary (km)	Relevant Qualifying Interest Feature(s)	Impact	Project Phase		
				C	O	D
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
Noss SPA	357.5	Gannet (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
Hoy SPA	253.8	Kittiwake (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
North Rona and Sula Sgeir SPA	383.4	Gannet (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
Sule Skerry and Sule Stack SPA	320.4	Gannet (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	

European Site	Distance to Site Boundary (km)	Relevant Qualifying Interest Feature(s)	Impact	Project Phase		
				C	O	D
			Barrier to movement		✓	
Mingulay and Berneray SPA	411	Razorbill (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Barrier to movement		✓	
Hermaness, Saxa Vord and Valla Field SPA	424.9	Gannet (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
St Kilda SPA	468.4	Gannet (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Collision		✓	
			Barrier to movement		✓	
Rathlin Island SPA	373	Razorbill (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Barrier to movement		✓	
		Seabird assemblage (breeding)	Disturbance / displacement	✓	✓	✓
			Changes in prey availability	✓	✓	✓
			Barrier to movement		✓	
Migratory Waterbird Sites (Estuarine)						
Ythan Estuary, Sands of Forvie and Meikle Loch SPA / Ythan Estuary and Meikle Loch Ramsar site	81.2	Eider (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Lapwing (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Pink-footed goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	

European Site	Distance to Site Boundary (km)	Relevant Qualifying Interest Feature(s)	Impact	Project Phase		
				C	O	D
		Redshank (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Waterfowl assemblage (non-breeding)	Collision		✓	
			Barrier to movement		✓	
Montrose Basin SPA and Ramsar site	101.7	Dunlin (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Eider (non-breeding)	Collision		✓	
					✓	
			Barrier to movement		✓	
		Greylag goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Knot (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Oystercatcher (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Pink-footed goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Redshank (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Shelduck (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Wigeon (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Waterfowl assemblage (non-breeding)	Collision		✓	
			Barrier to movement		✓	
Firth of Tay and Eden Estuary SPA and Ramsar site	122.6	Bar-tailed godwit (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Common Scoter (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Cormorant (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Dunlin (non-breeding)	Collision		✓	
			Barrier to movement		✓	

European Site	Distance to Site Boundary (km)	Relevant Qualifying Interest Feature(s)	Impact	Project Phase		
				C	O	D
		Eider (non-breeding	Collision		✓	
			Barrier to movement		✓	
		Goldeneye (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Goosander (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Grey plover (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Greylag (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Icelandic black-tailed godwit (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Long-tailed duck (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Oystercatcher (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Pink-footed goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Red-breasted merganser (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Redshank (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Sanderling (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Shelduck (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Velvet scoter (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Waterfowl assemblage (non-breeding)	Collision		✓	
			Barrier to movement		✓	
Lindisfarne SPA and Ramsar site	125.9	Bar-tailed godwit (non-breeding)	Collision		✓	
			Barrier to movement		✓	
			Collision		✓	

European Site	Distance to Site Boundary (km)	Relevant Qualifying Interest Feature(s)	Impact	Project Phase		
				C	O	D
		Common Scoter (non-breeding)	Barrier to movement		✓	
		Dunlin (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Eider (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Golden plover (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Grey plover (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Greylag goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Light-bellied brent goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Long-tailed duck (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Red-breasted merganser (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Redshank (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Ringed plover (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Sanderling (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Shelduck (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Whooper swan (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Wigeon (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Waterfowl assemblage (non-breeding)	Collision		✓	
			Barrier to movement		✓	
Firth of Forth SPA and Ramsar site	122.6	Bar-tailed godwit (non-breeding)	Collision		✓	
			Barrier to movement		✓	

European Site	Distance to Site Boundary (km)	Relevant Qualifying Interest Feature(s)	Impact	Project Phase		
				C	O	D
		Common Scoter (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Cormorant (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Curlew (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Dunlin (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Eider (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Golden plover (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Goldeneye (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Great crested grebe (non-breeding)	Collision		✓	
					✓	
			Barrier to movement		✓	
		Grey plover (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Knot (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Lapwing (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Long-tailed duck (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Mallard (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Oystercatcher (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Pink-footed goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Red-breasted merganser (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Red-throated diver (non-breeding)	Disturbance / displacement		✓	
			Collision		✓	
			Barrier to movement		✓	
		Redshank (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Ringed plover (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Sandwich tern (passage)	Collision		✓	
			Barrier to movement		✓	
		Scaup (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Shelduck (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Slavonian grebe (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Turnstone (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Velvet scoter (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Wigeon (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Waterfowl assemblage (non-breeding)	Disturbance / displacement	✓		✓
			Collision		✓	
			Barrier to movement		✓	
Northumbria Coast SPA and Ramsar site	128	Purple sandpiper (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Turnstone (non-breeding)	Collision		✓	
			Barrier to movement		✓	
Loch of Kinnordy SPA and Ramsar site	136	Pink-footed goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Greylag goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	
	136		Collision		✓	

European Site	Distance to Site Boundary (km)	Relevant Qualifying Interest Feature(s)	Impact	Project Phase		
				C	O	D
Holburn Lake and Moss SPA and Ramsar site		Greylag goose (non-breeding)	Barrier to movement		✓	
Cameron Reservoir SPA and Ramsar site	139	Pink-footed goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	
Greenlaw Moor SPA and Ramsar site	153	Pink-footed goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	
Din Moss - Hoselaw Loch SPA and Ramsar site	157	Pink-footed goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Greylag goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	
Loch Leven SPA and Ramsar site	171	Cormorant (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Gadwall (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Goldeneye (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Pink-footed goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Pochard (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Shoveler (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Teal (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Tufted duck (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Whooper swan (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Waterfowl assemblage (non-breeding)	Collision		✓	
			Barrier to movement		✓	
Fala Flow SPA and Ramsar site	172	Pink-footed goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	
	176		Collision		✓	

European Site	Distance to Site Boundary (km)	Relevant Qualifying Interest Feature(s)	Impact	Project Phase		
				C	O	D
South Tayside Goose Roosts SPA and Ramsar site		Pink-footed goose (non-breeding)	Barrier to movement		✓	
		Greylag goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Wigeon (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Waterfowl assemblage (non-breeding)	Collision		✓	
			Barrier to movement		✓	
Gladhouse Reservoir SPA and Ramsar site	185	Pink-footed goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	
Westwater SPA and Ramsar site	202	Pink-footed goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	
		Waterfowl assemblage (non-breeding)	Collision		✓	
			Barrier to movement		✓	
Slamannan Plateau SPA	215	Taiga bean goose (non-breeding)	Collision		✓	
			Barrier to movement		✓	

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APPENDIX 1 NATURA 2000 STANDARD DATA FORMS

Apx Table 1. 1: Natural 2000 Standard Data Forms for all European Sites considered in this LSE Screening Report (Site Screened in (✓) and out (×) for Further Assessment in the RIAA)

European Site	Site Code	Link to Natura 2000 Standard Data Form*	Screened in for Further Assessment in the RIAA
Diadromous Fish and Shellfish			
River Dee SAC	UK0030251	https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030251.pdf	✓
River South Esk SAC	UK0030262	https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030262.pdf	✓
Tweed Estuary SAC	UK0030292	https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030292.pdf	✓
River Tweed SAC	UK0012691	https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0012691.pdf	✓
River Tay SAC	UK0030312	https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030312.pdf	✓
River Spey SAC	UK0019811	https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0019811.pdf	✓
Berriedale and Langwell Waters SAC	UK0030088	https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030088.pdf	✓
River Teith SAC	UK0030263	https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030263.pdf	✓
River Oykel SAC	UK0030261	https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030261.pdf	✓
Marine Mammals			
Berwickshire and North Northumberland Coast SAC	UK0017072	https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0017072.pdf	✓
Isle of May SAC	UK0030172	https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030172.pdf	✓
Firth of Tay and Eden Estuary SAC	UK0030311	https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030311.pdf	×
Southern North Sea SAC	UK0030311	https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030395.pdf	✓
Moray Firth SAC	UK0019808	https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0019808.pdf	×
Doggerbank	DE1003301	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=DE1003301	×
Sylter Außenriff	DE1209301	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=DE1209301	×
Borkum-Riffgrund	DE2104301	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=DE2104301	×
Östliche Deutsche Bucht	DE1011401	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=DE1011401	×
Nationalpark Niedersächsisches Wattenmeer	DE2306301	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=DE2306301	×
NTP S-H Wattenmeer und angrenzende Küstengebiete	DE0916391	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=DE0916391	×
Helgoland mit Helgoländer Felssockel	DE1813391	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=DE1813391	×
Steingrund	DE1714391	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=DE1714391	×
Hamburgisches Wattenmeer	DE2016301	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=DE2016301	×
Unterweser	DE2316331	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=DE2316331	×
Unterelbe	DE2018331	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=DE2018331	×
Sydlige Nordsø	DK00VA347	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=DK00VA347	×
Gule Rev	DK00VA259	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=DK00VA259	×
Vadehavet med Ribe Å, Tved Å og Varde Å vest for Varde	DK00AY176	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=DK00AY176	×
Store Rev	DK00VA258	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=DK00VA258	×
Skagens Gren og Skagerak	DK00FX112	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=DK00FX112	×
Doggersbank	NL2008001	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=NL2008001	×
Klaverbank	NL2008002	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=NL2008002	×
Kosterfjorden-Väderöfjorden	SE0520170	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=SE0520170	×
Ornithology			
Fowlsheugh SPA	UK9002271	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002271.pdf	✓
Forth Islands SPA	UK9004171	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9004171.pdf	✓
Troup, Pennan and Lion's Heads SPA	UK9002471	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002471.pdf	✓
Coquet Island SPA	UK9006031	https://jncc.gov.uk/jncc-assets/SPA-N2K/uk9006031.pdf	✓
East Caithness Cliffs SPA	UK9001182	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9001182.pdf	✓
Copinsay SPA	UK9002151	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002151.pdf	✓
Flamborough and Filey Coast SPA	UK9006101	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9006101.pdf	✓
Auskerry SPA	UK9002381	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002381.pdf	×
Rousay SPA	UK9002371	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002371.pdf	✓
Marwick Head SPA	UK9002121	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002121.pdf	✓
Fair Isle SPA	UK9002091	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002091.pdf	✓
West Westray SPA	UK9002101	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002101.pdf	✓
Calf of Eday SPA	UK9002431	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002431.pdf	✓
Sumburgh Head SPA	UK9002511	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002511.pdf	✓
North Caithness Cliffs SPA	UK9001181	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9001181.pdf	✓
Noss SPA	UK9002081	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002081.pdf	✓
Hoy SPA	UK9002141	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002141.pdf	✓
Foula SPA	UK9002061	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002061.pdf	×
North Rona and Sula Sgeir SPA	UK9001011	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9001011.pdf	✓
Fetlar SPA	UK9002031	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002031.pdf	×

European Site	Site Code	Link to Natura 2000 Standard Data Form*	Screened in for Further Assessment in the RIAA
Ronas Hill – North Roe and Tingon SPA	UK9002041	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002041.pdf	×
Sule Skerry and Sule Stack SPA	UK9002181	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002181.pdf	✓
Ramna Stacks and Gruney SPA	UK9002021	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002021.pdf	×
Hermaness, Saxa Vord and Valla Field SPA	UK9002011	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002011.pdf	✓
Cape Wrath SPA	UK9001231	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9001231.pdf	×
Handa SPA	UK9001241	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9001241.pdf	×
Priest Island SPA	UK9001261	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9001261.pdf	×
Shiant Isles SPA	UK9002091	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9001041.pdf	×
Flannan Isles SPA	UK9001021	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9001021.pdf	×
St Kilda SPA	UK9001031	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9020332.pdf	✓
Mingulay and Berneray SPA	UK9001121	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9001121.pdf	✓
Rathlin Island SPA	UK9020011	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9020011.pdf	✓
Ythan Estuary, Sands of Forvie and Meikle Loch SPA, Ythan Estuary and Meikle Loch Ramsar site	UK9002221 UK13061	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002221.pdf https://rsis.ramsar.org/RISapp/files/RISrep/GB939RIS.pdf?language=en	✓
Montrose Basin SPA and Ramsar site	UK9004031 UK13046	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9004031.pdf https://rsis.ramsar.org/RISapp/files/RISrep/GB716RIS.pdf	✓
Firth of Tay and Eden Estuary SPA and Ramsar site	UK9004121 UK13018	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9004121.pdf https://rsis.ramsar.org/RISapp/files/RISrep/GB1034RIS.pdf	✓
Lindisfarne SPA and Ramsar site	UK9006011 UK11036	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9006011.pdf https://jncc.gov.uk/jncc-assets/RIS/UK11036.pdf	✓
Firth of Forth SPA and Ramsar site	UK9004411 UK13017	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9020316.pdf https://rsis.ramsar.org/RISapp/files/RISrep/GB1111RIS.pdf	✓
Northumbria Coast SPA and Ramsar site	UK9006131 UK11048	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9006131.pdf https://rsis.ramsar.org/RISapp/files/RISrep/GB1019RIS.pdf	✓
Loch of Kinnordy SPA and Ramsar site	UK9004051 UK13038	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9004051.pdf https://rsis.ramsar.org/RISapp/files/RISrep/GB652RIS.pdf	✓
Holburn Lake and Moss SPA and Ramsar site	UK9006041 UK11030	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9006041.pdf https://rsis.ramsar.org/RISapp/files/RISrep/GB302RIS.pdf	✓
Cameron Reservoir SPA and Ramsar site	UK9004131 UK13005	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9004131.pdf https://rsis.ramsar.org/RISapp/files/RISrep/GB650RIS.pdf	✓
Greenlaw Moor SPA and Ramsar site	UK9004281	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9004281.pdf	✓
	UK13022	https://rsis.ramsar.org/RISapp/files/RISrep/GB795RIS.pdf	
Din Moss - Hoselaw Loch SPA and Ramsar site	UK9004291 UK13010	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9004291.pdf https://rsis.ramsar.org/RISapp/files/RISrep/GB405RIS.pdf	✓
Loch Leven SPA and Ramsar site	UK9004111 UK13033	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9004111.pdf https://rsis.ramsar.org/RISapp/files/RISrep/GB72RIS.pdf?language=en	✓
Fala Flow SPA and Ramsar site	UK9004241 UK13015	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9004241.pdf https://rsis.ramsar.org/RISapp/files/RISrep/GB465RIS.pdf	✓
South Tayside Goose Roosts SPA and Ramsar site	UK9004401 UK13057	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9004401.pdf https://rsis.ramsar.org/ris/601?language=en	✓
Gladhouse Reservoir SPA and Ramsar site	UK9004231 UK13021	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9004231.pdf https://jncc.gov.uk/jncc-assets/RIS/UK13021.pdf	✓
Westwater SPA and Ramsar site	UK9004251 UK13060	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9004251.pdf https://rsis.ramsar.org/RISapp/files/RISrep/GB780RIS.pdf	✓
Slamannan Plateau SPA	UK9004441	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9004441.pdf	✓

* Hyperlinks correct at time of writing (28 February 2023)

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