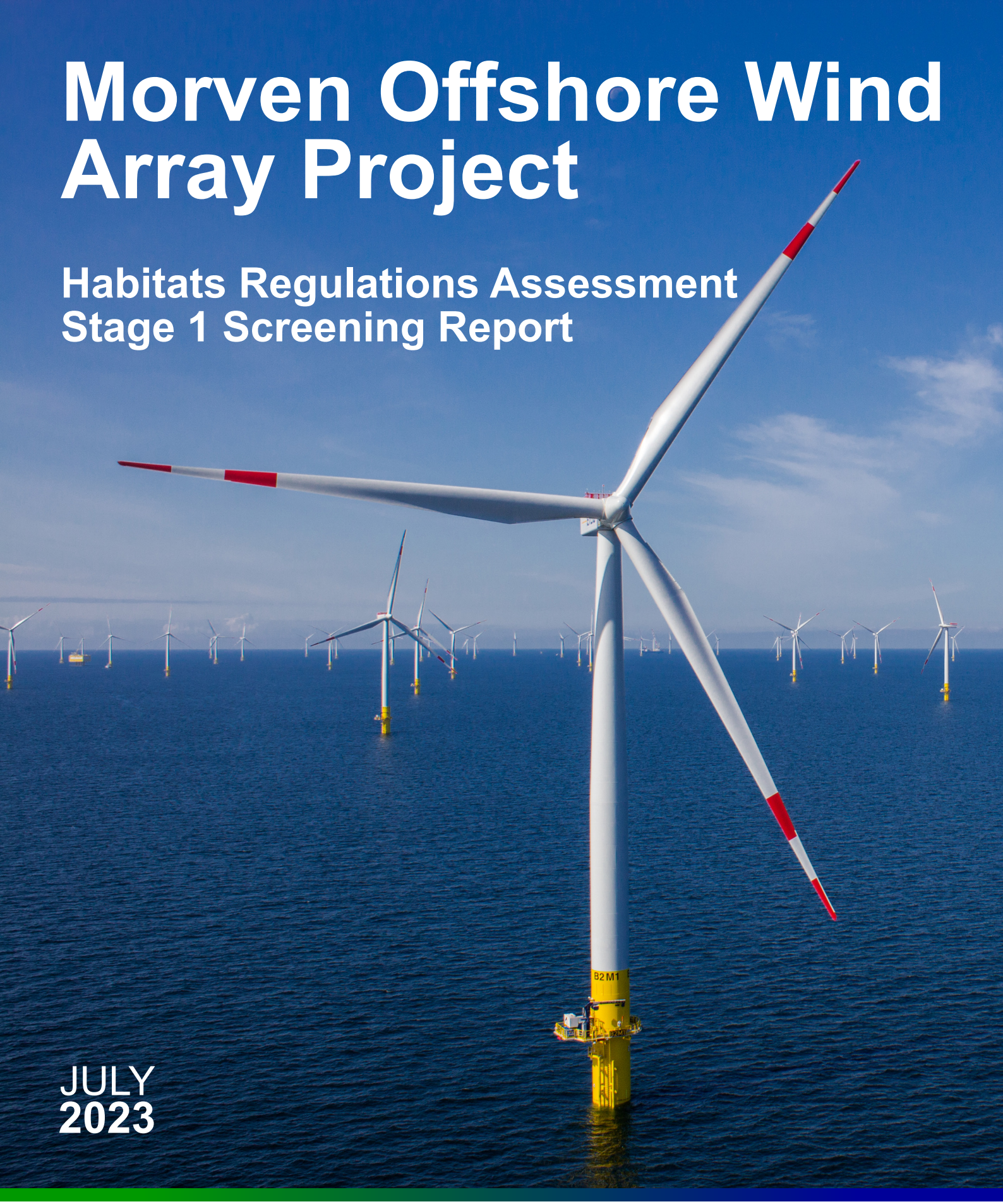
Morven Offshore Wind Array Project

Habitats Regulations Assessment
Stage 1 Screening Report



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Glossary

Term	Meaning
Applicant (the)	Morven Offshore Wind Limited; the entity making the consent applications.
Appropriate Assessment	An assessment to determine the implications of a plan or project on a European site in view of that site's conservation / management 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 Project	Refers to the wind turbines, Offshore Substation Platforms, associated foundations, inter-array cables, interconnector cables and associated infrastructure.
Array Project Assets	The Project's wind turbines, Offshore Substation Platforms and the respective required foundations and inter-array and interconnector cables.
Array Project Scoping Boundary (hereafter, "Scoping Boundary")	The Scoping Report red line boundary within which the wind turbines, Offshore Substation Platforms and associated foundations, inter-array cables, interconnector cables and associated infrastructure (the 'Array Project Assets') will be located.
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 Directive	Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (the Habitats Directive) is the European Union Directive from which the requirement for the consideration of potential impacts of the Array Project upon European sites and sites designated within the National Site Network is derived.
Habitat Regulations	The Conservation (Natural Habitats, & C.) Regulations 1994, the Conservation of Habitats and Species Regulations 2017, and the Conservation of Offshore Marine Habitats and Species 2017.
Habitat Regulations Appraisal	A process required by the Habitats Regulations of identifying Likely Significant Effects of a plan or project on a European site and (where Likely Significant Effects are predicted or cannot be discounted) carrying out an Appropriate Assessment to ascertain whether the plan or project will adversely affect the integrity of the European 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.
In-combination effects	In-combination effects are those effects that may arise from the Array Project in combination with other plans and projects.
Likely Significant Effect	Any effect that may reasonably be predicted as a consequence of a plan or project that may affect the conservation / management 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.
Likely Significant Effect In-Combination	A Likely Significant Effect that has arisen due to the effects of the Array Project acting together with other plans or projects (that would not have arisen from the Array Project acting alone).

Term	Meaning
Lines of Connectivity	Established using the Strategic Ornithological Support Services (SOSS) Migration Assessment Tool (MAT) (Wright et al., 2012) to identify connectivity between the Array Project and migratory waterbirds (i.e. those that pass through the Scoping Boundary).
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.
Morven Offshore Wind Limited	Morven Offshore Wind Limited, a joint venture between BP Alternative Energy Investments (bp), together with German partners Energie Baden-Württemberg AG (EnBW), ('the Applicant').
Ramsar Site	Wetlands of international importance, designated under the Ramsar Convention
Screening Tool	The Foraging Ranges Screening Tool was developed by NIRAS for NatureScot and applies the recommended screening parameters i.e., Woodward et al., 2019, mean maximum foraging range plus 1 Standard Deviation (SD) to identify connectivity between European sites and relevant breeding seabirds. The Foraging Ranges Screening Tool identifies where the Scoping Boundary overlaps with a foraging range(s) and provides a list of sites and features with potential connectivity to the Array Project.
Site of Community Importance (SCI)	Defined in the Habitats Directive as a site which, in the biogeographical region or regions to which it belongs, contributes significantly to the maintenance or restoration at a favourable conservation status of a natural habitat type in Annex I, or of a species in Annex II, of the Habitats Directive and may also contribute significantly to the coherence of the Natura 2000 network. The site may also contribute significantly to the maintenance of biological diversity within the biogeographic region or regions concerned. For animal species ranging over wide areas, SCIs shall correspond to the places within the natural range of such species which represent the physical or biological factors essential to their life and reproduction.
Special Areas of Conservation (SAC)	Special Areas of Conservation are areas designated for the conservation of certain plant and animal species listed in the Habitats Directive.
Special Protection Areas (SPA)	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.

Abbreviations

Acronym	Meaning
CPS	Cable Protection System
cSAC	Candidate SAC
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EMP	Environmental Management Plan
EU	European Union
FCS	Favourable Conservation Status
GNS MU	Greater North Sea (GNS) Management Unit (MU)
HRA	Habitats Regulations Appraisal
IAMMWG	Inter-Agency Marine Mammal Working Group

Acronym	Meaning
IMO	International Maritime Organization
INNS	Invasive Non-Native Species
INNSMP	INNS Management Plan
LSE	Likely Significant Effect
MAT	Migration Assessment Tool
MHWS	Mean High-Water Springs
MPCP	Marine Pollution Contingency Planning
MD-LOT	Marine Directorate – Licensing Operations Team
MSS	Marine Scotland Science
MU	Management Unit
MvOWL	Morven Offshore Wind Limited
NnG	Neart Na Gaoithe (OWF)
OSP	Offshore Substation Platform
OWF	Offshore windfarm
PDE	Project Design Envelope
PO	Plan Option
pSAC	Possible Special Area of Conservation
pSPA	Potential Special Protection Area
RIAA	Report to Inform Appropriate Assessment
SAC	Special Area of Conservation
SCI	Site of Community Importance
SD	Standard Deviation
SCOS	Special Committee on Seals
SMP-OWE	Sectoral Marine Plan for Offshore Wind
SNCB	Statutory Nature Conservation Body
SOSS	Strategic Ornithological Support Services
SOSSMAT	Strategic Ornithological Support Services Migration Assessment Tool
SPA	Special Protection Area
SSC	Suspended Sediment Concentration(s)
TP	Transition Piece
UK	United Kingdom
UXO	Unexploded Ordnance
ZoI	Zone of Influence

Units

Unit	Description
km	Kilometre
km^2	Kilometre squared
m	Metre
m^2	Metre squared
nm	Nautical miles

1 Introduction

1.1 Overview

1.1.1.1 Morven Offshore Wind Limited, a joint venture between bp Alternative Energy Investments (bp), together with German partner Energie Baden-Württemberg AG (EnBW) has been awarded a seabed option (Option Agreement) under the 2021/22 ScotWind leasing round. The bp/EnBW collaboration is jointly developing the Morven Offshore Wind Project (hereafter 'the Project'); an offshore wind farm within Plan Option (PO) area E1 identified in the Scottish Government's Sectoral Marine Plan for Offshore Wind (Scottish Government, 2020).

1.1.1.2 The Project is a proposed large-scale fixed-foundation offshore wind farm (OWF) located approximately 60km from the Aberdeenshire coast. bp/EnBW are working to secure the necessary consents, licences and permissions to build and operate the Project through, Morven Offshore Wind Limited (hereafter, 'the Applicant').

1.1.1.3 As a result of the Holistic Network Design process, brought under the Offshore Transmission Network Review's 'Pathway to 2030' workstream, the Applicant will seek to consent the Project's generation and transmission infrastructure separately. The Morven Offshore Wind Array Project (hereafter, 'Array Project') comprises the Project's wind turbines, Offshore Substation Platforms (OSP) and associated foundations and structures and inter-array and interconnector cables. This infrastructure is, hereafter, referred to as the 'Array Project Assets'. The Array Project is the subject of this Habitats Regulations Appraisal (HRA) Stage 1 Screening Report.

1.1.1.4 This Array Project HRA Stage 1 Screening Report considers only the Array Project Assets. The Applicant intends to submit separate consents, licences and permissions for the transmission aspects of the Project (other than the OSPs) under the Morven Offshore Wind Transmission Project (hereafter, 'Transmission Project'). Therefore, the offshore export cable and onward onshore grid connection will not be discussed further within this Stage 1 Screening Report and will be subject to a separate HRA, as required. The Transmission Project will be considered as an in-combination project, as discussed in section 6.

1.1.1.5 The Project's consenting strategy is currently to seek to consent its generation and transmission aspects, each supported by appropriate environmental assessments (and EIA Reports), as follows:

- Array Project:
  - Marine licences under the Marine and Coastal Access Act 2009 (separate marine licences will be sought for the generating assets and the OSPs) and a Section 36 consent under the Electricity Act 1989 for the generating assets.
- Transmission Project:
  - Currently anticipated to be two marine licences sought under the Marine and Coastal Access Act 2009 (one in England and one in Scotland) for the Transmission Project comprising the Project's offshore transmission assets and associated activities.
  - Planning permission under the Town and Country Planning Act 1990 (TCPA) for the onshore transmission assets, substation and associated activities.
- Further transmission facilities to be confirmed.

1.2 Habitats Regulations Appraisal

1.2.1.1 This HRA Stage 1 Screening Report has been produced to inform the HRA for the Array Project. It provides information to enable the screening of the Array Project with respect to its potential to have a Likely Significant Effect (LSE) on European sites. The requirement for the consideration of potential impacts of the Array Project upon European sites is derived from the European Union's (EU) Habitats Directive. The relevant Habitats Regulations for the Array Project are the Conservation of Offshore Marine Habitats and Species Regulations 2017 and the Conservation of Habitats and Species Regulations 2017. The implications of the United Kingdom's departure from the EU (hereafter referred to as 'EU Exit') are addressed in section 2.

1.2.1.2 Under the Habitats Regulations, a HRA must be carried out for all plans and projects for which LSE on European sites cannot be discounted. As per the Habitats Regulations, these sites include Special Areas of Conservation (SACs), candidate SACs (cSACs), Sites of Community Importance (SCIs) and Special Protection Areas (SPAs). As a matter of policy (Office of the Deputy Prime Minister (ODPM) Circular 06/2005), European sites also include candidate (cSACs) and possible SACs (pSACs), and potential SPAs (pSPAs), Sites of Community Importance (SCIs) and Ramsar Sites (i.e. listed under the Ramsar Convention on Wetlands of International Importance).

1.2.1.3 The scope of this document covers all relevant European sites and relevant qualifying interest features seaward of Mean High-Water Springs (MHWS). Any potential impacts from offshore effects on onshore sites landward of MHWS will be considered in this HRA Stage 1 Screening Report. Where no LSE from the Array Project 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 at the next stage of the HRA process; Stage 2 Appropriate Assessment (hereafter, Appropriate Assessment).

1.2.1.4 More information on the HRA process and underpinning legislation is provided in section 2.

1.3 Purpose of this Report

1.3.1.1 This document provides the information to support screening for LSE required by the Habitats Regulations. It comprises the screening stage (see Figure 2.1) and, therefore, provides information to enable the screening of the Array Project with respect to its potential to have an LSE on European sites. This HRA Stage 1 Screening Report has been developed alongside the Array Project Environmental Impact Assessment (EIA) Scoping Report (hereafter, 'the Scoping Report).

1.3.1.2 The screening exercise presented in this report is based on the current understanding of the baseline environment and proposed activities associated with the Array Project and is based on the project and site specific information currently available. This is covered in detail in section 5.1. Changes that may arise as a result of further site specific surveys, environmental assessment, consultation, and/or refinements to the Project Design Envelope (PDE) will be reflected in the Report to Inform Appropriate Assessment (RIAA).

1.4 Structure of this Report

1.4.1.1 The structure of this Stage 1 Screening Report is outlined below:

- section 2: overview of the HRA process and legislative context;
- section 3: description of the key components of the Array Project;
- section 3: initial identification of European sites and features that may be affected by the Array Project;
- section 5: determination of LSE with respect to relevant qualifying interest features of the European sites under consideration;
- section 6: a summary of the approach to the in-combination assessment;
- section 7: a summary of the European sites and relevant qualifying interest features for which the screening process has identified LSEs and, therefore, a requirement for further assessment within the RIAA.

1.5 Project Overview

1.5.1 Array Project Assets

1.5.1.1 The Array Project comprises the Array Project Assets only; i.e. the Project's wind turbines, Offshore Substation Platforms (OSPs) and respective required foundations and inter-array and interconnector cables and associated infrastructure. Further project information is provided in section 3: Project Description. The construction programme for the Array Project is yet to be confirmed but will take place within a maximum of seven years. The key components of the Array Project will include:

- up to 191 wind turbines and associated structures and foundations;
- up to 844km of inter-array and 751km of interconnector cables;
- up to 11 OSPs and associated support structures and foundations.

1.5.2 Array Project Scoping Boundary

1.5.2.1 The area within which the Array Project Assets will be located is referred to as the 'Array Project Scoping Boundary' (hereafter, 'the Scoping Boundary'). The Scoping Boundary is located approximately 60km from the closest point on the coast of Aberdeenshire and covers a c. 860km^2 area within the Scottish Offshore region (12-200 nautical miles (nm)) and the United Kingdom's (UK) Exclusive Economic Zone (EEZ). The Scoping Boundary is presented in Figure 1.1 and establishes the Array Project's development area and the geographic basis of this Stage 1 Screening exercise.

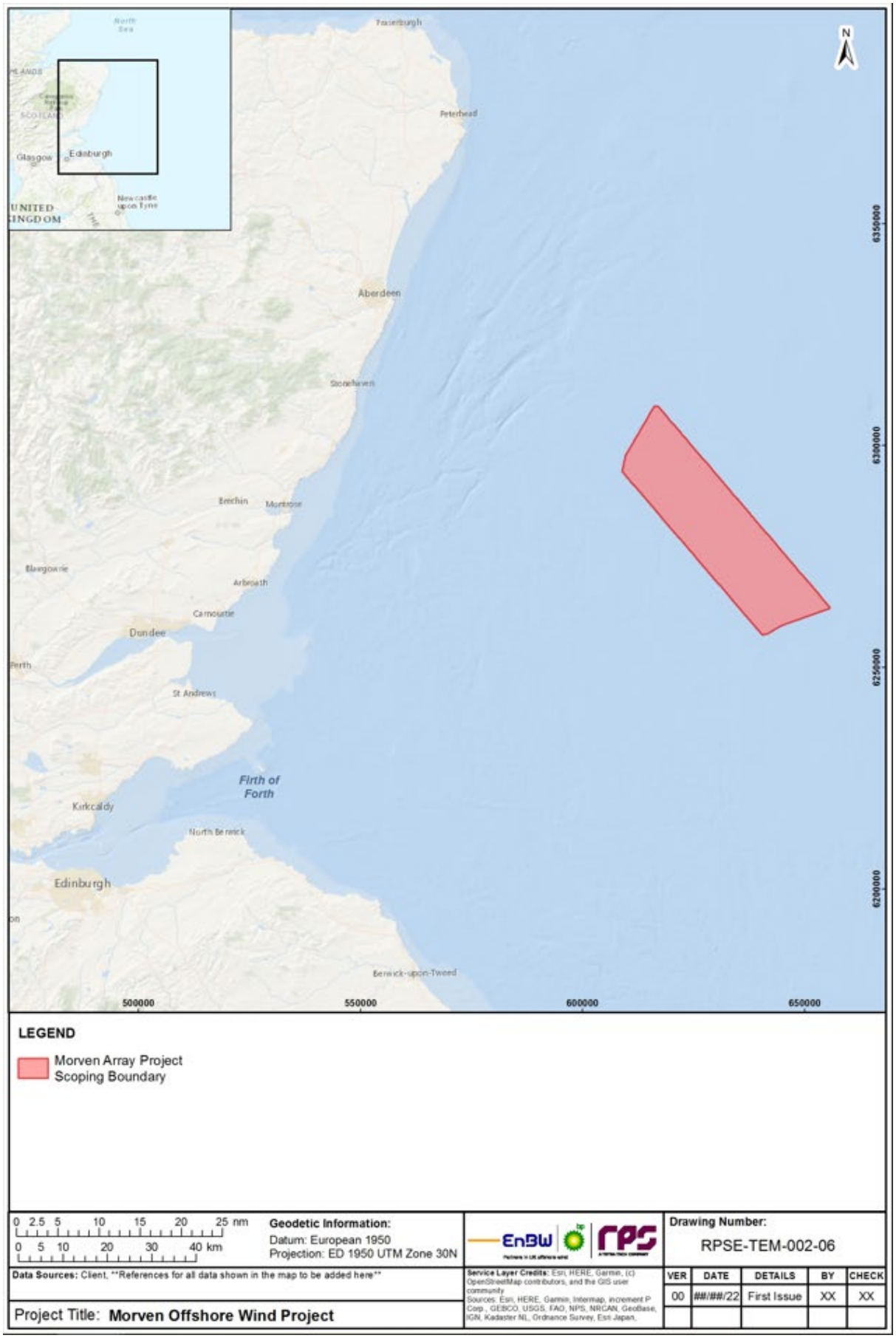

Figure 1.1: Array Project Scoping Boundary

1.6 Relevant Consultations

1.6.1.1 To successfully deliver a proportionate EIA and RIAA, the reports will incorporate advice from stakeholders throughout the development process to address concerns and develop appropriate mitigation, as required. Chapter 5: Consultation Process of the Array Project's Scoping Report (hereafter, 'Scoping Report') provides further detail of the proposed approach to stakeholder engagement throughout the EIA process of the Array Project. Appendix 4: Draft Stakeholder Engagement Plan of the Scoping Report sets out the Applicant's intentions for future engagement.

1.6.1.2 A summary of consultation undertaken to date in relation to the Array Project, that is of relevance to the HRA and this Stage 1 Screening Report, is provided in Table 1.1.

1.6.2 Array Project Scoping Workshop

1.6.2.1 Early in the process, the Applicant was advised by the Marine Directorate – Licensing Operations Team (MD-LOT)[1] that a Scoping Workshop could precede the formal submission and publication of the Scoping Report and request for a Scoping and LSE Opinion. The purpose of the Scoping Workshop was understood to be an opportunity for the Applicant to consult on the draft scope, and for stakeholders to request additional information on key topics and impact receptor pathways to be addressed in the Scoping and HRA reports.

1.6.2.2 The Scoping Workshop for the Array Project was held on 18 and 19 April 2023 and consisted of a series of topic specific sessions over the two days, targeted to relevant stakeholders. MD-LOT and NatureScot assisted in the identification of these stakeholders and coordination of the Scoping Workshop.

1.6.2.3 The Applicant was encouraged to provide technical reports and data used to inform the assessments and to prepare topics and questions to stakeholders in advance of the Scoping Workshop to enable feedback and to frame focused responses. Further detail, including consultees and a summary of the relevant information provided to consultees in advance of the Scoping Workshop is provided in Appendix 3: Summary of Scoping Workshop Consultation of the Scoping Report.

1.6.2.4 European sites will be considered through the HRA process, which will run in parallel to the EIA. However, for efficiency and at the request of Marine Directorate, the intended approach to the HRA was included in the Scoping Workshop. Consultees were able to give their views and to provide information that has been addressed in the finalisation of this Stage 1 Screening Report. Details of discussions relevant to the HRA and how comments have been addressed are included in Table 1.1.

1.6.2.5 Following the Scoping Workshop, stakeholders were invited to provide feedback to the questions asked per topic and on the methodology statements shared. Written feedback was received electronically from NatureScot on 25 May 2023. The aspects of this advice that are relevant to the HRA are also included in Table 1.1.

[1] Formerly Marine Scotland Licensing Operations Team. From June 2023, Marine Scotland became known as Marine Directorate and is referred to throughout this report.

Table 1.1: Summary of consultation undertaken to date which is of relevance to the HRA

Date	Topic	Overarching theme	Method of engagement	Stakeholder	Summary of stakeholder feedback	Applicant's response and relevant cross reference
11.08.21	Benthic subtidal ecology; marine mammals; offshore ornithology	Data and survey scopes	Meeting: Online via Teams	MD-LOT NatureScot Marine Scotland Science (MSS) Royal Society for the Protection of Birds (RSPB)	Discuss approach to baseline data review and development of offshore survey scopes for fish and shellfish ecology, benthic subtidal ecology, marine mammals and offshore ornithology.	Not Applicable
21.10.21	Marine mammals and offshore ornithology	Data and survey scopes	Meeting: Online via Teams	NatureScot MD-LOT MSS RSBP	Follow up consultation from initial meeting on 11 August 2021 to share proposed draft survey scopes and get feedback. Draft reports (baseline data and surveys scopes) shared prior to meeting.	Not Applicable
25.05.22	Marine mammals	Passive Acoustic Monitoring	Email correspondence	MSS NatureScot	Advice on survey proposal for Passive Acoustic Monitoring (PAM) and intention to deploy PAM during Metocean survey campaign to collect underwater soundscape information and presence/absence data for marine mammals.	Not Applicable
02.03.23	Offshore ornithology	Pre-Scoping ornithology discussion	Meeting: Online via Teams	NatureScot	To discuss current bird guidance (NatureScot advice notes) and tools for assessment of effects on offshore ornithology and identify any issues and possible solutions in the context of avian flu.	Not Applicable
17.03.23	General	Project Introductions	Meeting: Online via Teams	NatureScot MD-LOT Scottish Government	Introduction of Array Project with the Marine Directorate, Scottish Government and NatureScot representatives.	Not Applicable
18.04.23	Fish and shellfish ecology	EIA Approach	Scoping Workshop session	NatureScot	NatureScot suggested that migratory fish should be assessed in the EIA not the HRA.	The Applicant does not think the uncertainty in their migration routes and connectivity, or a lack of population data, are reasons to screen all diadromous fish out, or that this rationale would be compliant with the Habitat Regulations. Atlantic

Date	Topic	Overarching theme	Method of engagement	Stakeholder	Summary of stakeholder feedback	Applicant's response and relevant cross reference
						salmon are, therefore, included within the assessment.
18.04.23	Marine mammals	Screening approach for seals	Scoping Workshop session	NatureScot	Any impacts on seals further than the 20km range would not be able to be determined.	Noted, however, that any connectivity identified for seals further than 20km will be included in the HRA.
18.04.23	Marine mammals	Screening approach for seals	Scoping Workshop session	NatureScot	Agree with screening out transboundary sites and do not recommend screening in the Southern North Sea SAC.	Noted.
18.04.23 25.05.23	Marine mammals	Impact pathway	Scoping Workshop session followed up in written advice	NatureScot	Requested more information on disturbance from vessels, given that vessels will be transiting from ports. NatureScot would expect narrative on vessel movement and potential disturbance to be screened into the scoping report to determine if it can be scoped out. Otherwise, NatureScot agree with the impacts screened in for further assessment within the RIAA.	Disturbance to marine mammals from vessel use and other (non-piling) sound has been scoped into the EIA and, where there is potential for effects on SACs, this will be taken forward for further assessment in the RIAA.
18.04.23 25.05.23	Marine mammals	Preliminary screening of sites	Scoping Workshop session followed up in written advice	NatureScot	NatureScot advises that of the 5 European sites in the UK, only the Moray Firth SAC should be screened in. The underwater sound assessment will provide information on connectivity to the Moray Firth SAC for bottlenose dolphin.	Noted.
18.04.23	Marine mammals	Preliminary screening of sites	Scoping Workshop session	NatureScot	NatureScot advised that harbour porpoise are ubiquitous in Scottish Seas and it is not possible to identify if they are from an SAC population. Therefore, NatureScot advises that no transboundary or cross border SACs need to be included in the LSE screening (i.e. all 19 transboundary SACs listed and the Southern North Sea SAC can be screened out of the HRA assessment).	Noted thank you. The 19 transboundary sites have been screened out of the assessment although we will await the formal scoping opinion and the full suite of advice from all consultees on the remaining UK sites.
25.05.23	Marine mammals	Preliminary screening of sites	Written advice	NatureScot	For grey seals, NatureScot advises screening in sites for assessment if the project site/impact radius is within 20km of the SAC. Although grey	Noted. The Applicant will investigate the results of the telemetry report to provide evidence regarding the

Date	Topic	Overarching theme	Method of engagement	Stakeholder	Summary of stakeholder feedback	Applicant's response and relevant cross reference
					seals can and do forage considerable distances, the Conservation Objectives for grey seal SACs are related to the protection of the breeding colony. During this sensitive time, grey seals do not travel in general further than the 20km and, therefore, NatureScot uses this distance as a connectivity buffer. Outside the breeding season the number of grey seals present at a protected site can dramatically decrease. There is evidence to show that grey seals do not forage close to the SAC outside the breeding season and instead can travel to different management units when foraging (Carter et al., 2022[2]). NatureScot appreciates the use of telemetry data and, while this could provide evidence of grey seal travelling through the proposed array site, NatureScot is content for grey seal SACs to be scoped out if there is no evidence of hotspots or regular foraging areas within the project boundary.	movements of individuals from the SAC during the grey seal breeding season to determine the potential connectivity with the Array Project. SACs will be screened in where there is deemed to be potential connectivity with the Scoping Boundary, particularly during the breeding season. As per the response above, the Applicant would welcome further discussion on this with NatureScot to understand its position or await the formal Opinion on SAC screening.
25.05.23	Marine mammals	Preliminary screening of sites	Written advice	NatureScot	For harbour seals, NatureScot advises screening sites in for assessment if the project site/impact radius is within 50km of the SAC. Harbour seals show greater site fidelity throughout the year and, unlike grey seals, there is no seasonal difference. NatureScot would consider ranges further than this if there is tagging information to suggest SAC animals were regularly using the project site area. NatureScot appreciates the use of telemetry data and while this could provide evidence of harbour seals travelling through the proposed Scoping Boundary, NatureScot is content for harbour seal SACs to be scoped out if there is	Noted. The Applicant will investigate the results of the telemetry report to provide evidence regarding movements of individuals from the SAC at all times of year to determine the potential connectivity with the Array Project.

[2] Carter *et al.,* 2022. Sympatric seals, satellite tracking and protected areas: Habitat-based distribution estimates for conservation and management. Front. Mar. Sci 9.875896

Date	Topic	Overarching theme	Method of engagement	Stakeholder	Summary of stakeholder feedback	Applicant's response and relevant cross reference
					no evidence of hotspots or regular foraging areas within the project boundary.	
25.05.23	Marine mammals	Preliminary screening of sites	Written advice	NatureScot	As NatureScot advised above, only the Moray Firth SAC should be screened in and taken forward for further assessment in the RIAA.	Advice noted. Please see the response above.
18.04.23	Diadromous fish	HRA Approach	Scoping Workshop session	NatureScot	NatureScot notes that for diadromous fish species there is limited knowledge of distribution and behaviour of these species in the marine environment. For example, the precise migration routes of adult or juvenile Atlantic salmon or direction taken by migrating adult European eels is not fully known. Published information indicates that European smelt and River lamprey are primarily, though probably not exclusively, associated with estuarine environments. Shad might also prefer estuarine environments. The ScotMER evidence map process for diadromous fish confirms the evidence gaps, particularly with respect to spatial and temporal distribution, as well as uncertainty around migration routes and connectivity to protected sites. The ScotMER process is an important vehicle for helping to address these evidence gaps and uncertainties. NatureScot, therefore, advises that diadromous fish species should be assessed through EIA only and not through HRA. For some species, like seals, NatureScot has a reasonable understanding of connectivity to individual SACs. NatureScot also has population estimates for nearly all seal SAC populations in the standard data forms, which are part of the citation package. For diadromous fish species NatureScot does not have population data for any salmon or lamprey SAC on the data forms.	The Applicant does not think the uncertainty in their migration routes and connectivity, or a lack of population data, are reasons to screen all diadromous fish out, or would be compliant with the Habitat Regulations. Atlantic salmon are, therefore, included within the assessment.

Date	Topic	Overarching theme	Method of engagement	Stakeholder	Summary of stakeholder feedback	Applicant's response and relevant cross reference
					This inability to understand connectivity to the development area, both to and within individual rivers, currently prohibits an informed assessment of the impact on individual site integrity. https://www.gov.scot/publications/diadromous-fish-specialist-receptor-group/ (published 26 January 2023) https://www.gov.scot/publications/wild-salmon-strategy-implementation-plan-2023-2028/ (published 1 February 2023)	
25.05.2023	Offshore ornithology	Approach to HRA Screening	Written advice	NatureScot	Please see Guidance Note 4[3] for further advice with respect to defining connectivity with marine SPAs, noting the use of a 15km boundary as well as consideration of vessel transit routes in relation to potential for disturbance effects. Connectivity during the breeding season should be based on Woodward *et al.* (2019) or Biologically Defined Minimum Population Scales (BDMPS) (Furness, 2015) in the non-breeding season (with exceptions detailed in our guidance note, e.g. for guillemot).	Approach to be further discussed and agreed with NatureScot.
19.04.23 25.05.23	Offshore ornithology	HRA Approach	Scoping Workshop session followed up in written advice	NatureScot	NatureScot advises that magnitude of effect, as referenced in Ornithology workshop slides 13,15 and 16, should not be considered at the initial LSE screening stage.	Noted. For breeding seabirds in the non-breeding season (BDMPS) the approach used for Berwick Bank OWF has been followed (i.e. contribution of SPA populations to BDMPS population).
19.04.23	Offshore ornithology	HRA Approach	Scoping Workshop session	NatureScot	There are, however, two areas at this stage where NatureScot considers further refinement beyond theoretical connectivity may be	Noted, NatureScot advice will be followed.

[3] https://www.nature.scot/doc/guidance-note-4-guidance-support-offshore-wind-applications-ornithology-determining-connectivity

Date	Topic	Overarching theme	Method of engagement	Stakeholder	Summary of stakeholder feedback	Applicant's response and relevant cross reference
					possible. These provide a reasonable biological sense check and should be clearly explained in the Stage 1 LSE screening report: • consideration of at-sea foraging distance; • where there is clear evidence that segregation of foraging behaviour exists based on tracking data.	
19.04.23	Offshore ornithology	HRA Approach	Scoping Workshop session	NatureScot	Once project parameters are further updated and analysis of the two-year digital aerial survey campaign is complete, NatureScot would then expect further refinement of the SPA long list. This should be reflective of the species found within the array and export cable corridor (and associated buffer), when and in what density, and also consider the impacts to which they may be vulnerable. If further consultation is requested at this stage, NatureScot is happy to review the list again prior to submission of the Report to Information the Appropriate Assessment (RIAA).	Noted and agreed the long-list will be reviewed based on site-specific data and feedback from consultation at an early stage in the RIAA.
19.04.23	Offshore ornithology	HRA Approach	Scoping Workshop session	NatureScot	Where 'as built' information is available, NatureScot would expect this information to be used - in Scotland this is usually contained within the Design Specification Layout Plan (DSLP).	Noted.
25.05.2023	Offshore ornithology	Approach to HRA Screening	Written advice	NatureScot	The long list, at an early stage of the proposed project, is by nature going to be long. NatureScot is content with this as it guards against pre-judging species and impacts. There are, however, two areas at this stage where NatureScot considers further refinement beyond theoretical connectivity may be possible. These provide a reasonable biological	Noted. NatureScot advice will be followed.

Date	Topic	Overarching theme	Method of engagement	Stakeholder	Summary of stakeholder feedback	Applicant's response and relevant cross reference
					sense check and should be clearly explained in the Stage 1 LSE screening report: • consideration of at-sea foraging distance; • where there is clear well-evidence segregation of foraging behaviour based on tracking data.	
25.05.2023	Benthic subtidal ecology; fish and shellfish	Impact Pathways	Written advice	NatureScot	NatureScot agrees with the use of a 20km buffer for screening in SACs designated for Annex I habitats.	Noted.
25.05.2023	Benthic subtidal ecology; fish and shellfish	EIA Approach	Written advice	NatureScot	NatureScot agrees that no SACs designated for Annex I habitats are required to be taken forward for determination of LSE.	Agreement noted.
25.05.2023	Benthic subtidal ecology; fish and shellfish	Annex I Habitats	Written advice	NatureScot	NatureScot notes that for diadromous fish species there is limited knowledge of distribution and behaviour of these species in the marine environment. For example, the precise migration routes of adult or juvenile Atlantic salmon or direction taken by migrating adult European eels is not fully known. Published information indicates that European smelt and River lamprey are primarily, though probably not exclusively, associated with estuarine environments. Shad might also prefer estuarine environments.	The Applicant does not consider the uncertainty in their migration routes and connectivity, or a lack of population data, are reasons to screen all diadromous fish out, or would be compliant with the Habitat Regulations. Atlantic salmon are, therefore, included within the assessment.

2 Habitats Regulations Process

2.1 Legislation Overview

2.1.1.1 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 EU's legal framework for the protection of wild fauna and flora and establishes a network of internationally important sites, designated for their ecological status. This network of designated sites is comprised of the following:

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

2.1.1.2 The UK is no longer an EU Member State; however, the Habitats Regulations, as described in section 1.2, continue to provide the legislative backdrop for HRA in the UK.

2.1.1.3 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.

2.1.1.4 As outlined in section 1.2, in Scotland, the Habitats Directive is implemented in inshore and offshore waters through the Habitats Regulations, which encompasses the following legislation:

- The Conservation (Natural Habitats, &c.) Regulations 1994 (apply onshore in Scotland and in Scottish territorial waters within 12nm);
- The Conservation of Habitats and Species Regulations 2017 (apply to certain consent decisions including an application for section 36 consent under the Electricity Act 1989);
- The Conservation of Offshore Marine Habitats and Species Regulations 2017 (apply in Scottish offshore waters between 12nm-200nm and in English waters);
- The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019;
- The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019.

2.2 European sites post EU Exit – The National Site Network

2.2.1.1 Following EU Exit, European sites located within the UK are no longer part of the Natura 2000 network (nor known as Natura sites) but instead combine to form the UK's 'National Site Network'. The National Site Network 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. In accordance with the Scottish Government's EU Exit guidance and the Habitats Regulations, 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).

2.2.1.2 Management objectives for the National Site Network are established in the EU Exit 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;
- 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 Habitats Regulations Appraisal process

2.3.1.1 HRA is generally recognised as a progressive, staged process built around the wording of Article 6(3) of the Habitats Directive (as transposed by the Habitats Regulations), with the outcome at each stage defining the requirement for, and scope of, the next. Compliance with the requirements of the HRA Regulations can be demonstrated if the stages are followed in the correct and particular sequence.

2.3.1.2 The European Commission (EC) (2021) guidance identifies a staged process to the assessment of plans and projects on European sites:

- Stage 1: Screening;
- Stage 2: Appropriate Assessment;
- Stage 3: Derogation from Article 6(3) under certain conditions.

2.3.1.3 A flowchart illustrating the approach to the HRA process, adapted from the EC (2021), is presented in Figure 2.1. This report considers the 'Could the plan or project have a likely significant effect (LSE) on an EU Site' step in the HRA process, shown in Figure 2.1.

2.3.1.4 The Habitats Regulations make it clear that the person applying for the consent for 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.

2.3.1.5 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 Project, 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 that have no connectivity to the Array Project 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).

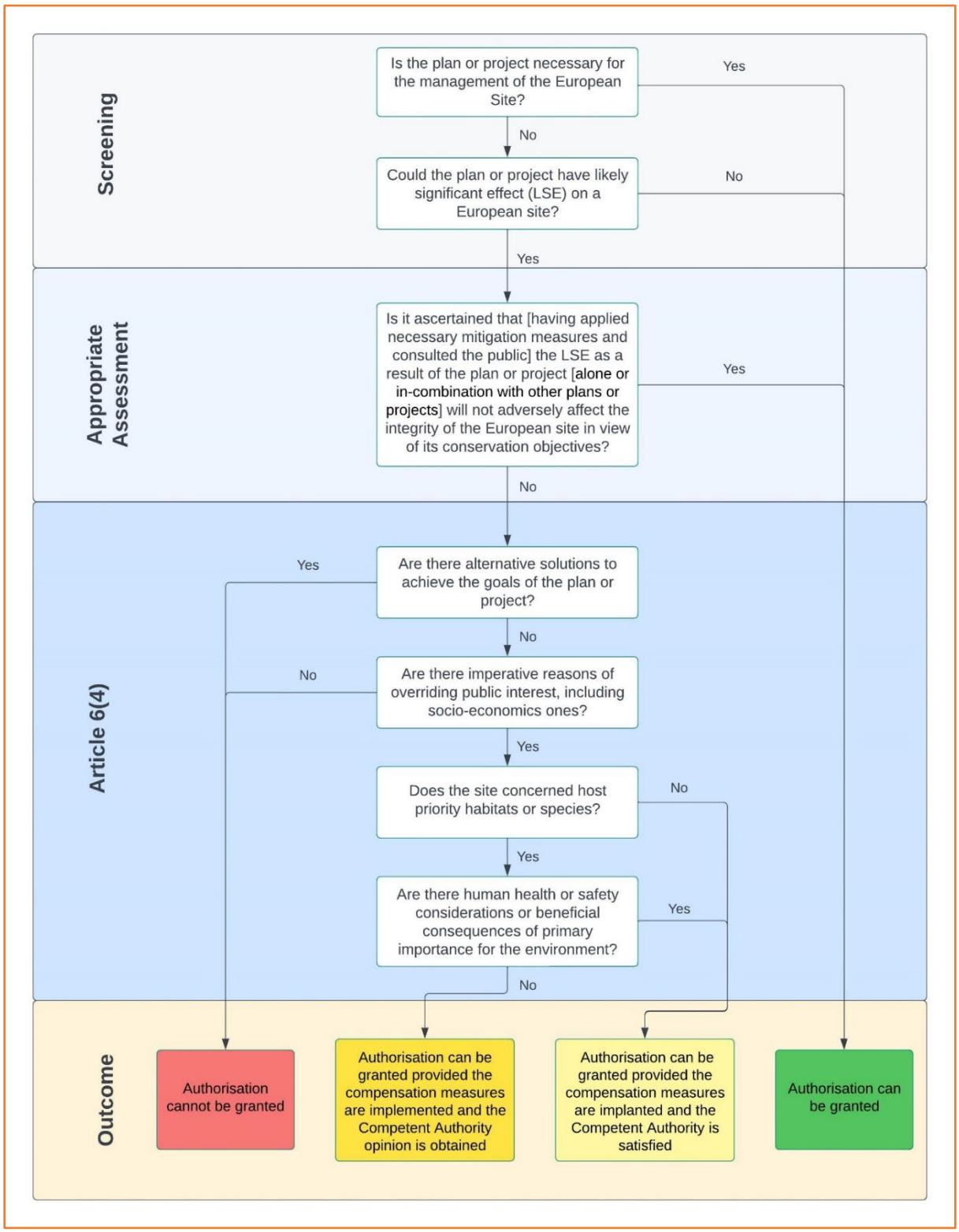

Figure 2.1: Stages in the Habitats Regulations Appraisal process (adapted from European Commission, 2021)

2.4 Process for identifying European sites and relevant qualifying features

2.4.1.1 To facilitate the identification of the European sites and features to be considered in the LSE Screening for the Array Project, a criteria-based process has been applied. This approach is considered to be appropriate due to the large spatial scale of the Array Project, the wide-ranging nature of many of the features of European sites that may be affected (i.e. birds and marine mammals) and, therefore, the number of European sites that could potentially be affected.

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

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

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

2.4.1.5 Criterion 3 identifies any European sites, not already screened in by criteria 1 or 2, where the predicted ZoI of the Array Project overlaps with a European site and/or qualifying interests of the European 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 within the Scoping Boundary (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 Project overlaps with one or more European site.
2	European site with qualifying mobile features/species (e.g. birds, Annex II marine mammals, Annex II diadromous fish) whose range (e.g. foraging, migratory, overwintering, breeding or natural habitat range) overlaps with the Array Project.
3	European sites located within the potential ZoI of potential impacts associated with the Array Project and/or qualifying interest features of European sites, whose foraging ranges overlap the predicted ZoI of potential impacts associated with the Array Project (e.g. habitat disturbance, sound and disturbance/displacement).

2.5 Offshore Wind Energy Sectoral Marine Plan: Habitats Regulations Appraisal

2.5.1.1 The Scottish Government produced a Sectoral Marine Plan for Offshore Wind (SMP-OWE) (Scottish Government, 2020) (hereafter, referred to as 'the plan'), as part of Scotland's commitment to long-term decarbonisation of the energy sector. The plan was adopted in October 2020 and built upon the 2013 Draft Sectoral Marine Plan for Offshore Renewable Energy in Scottish Waters (Scottish Government, 2013).

2.5.1.2 The plan identified 15 POs for offshore wind development in Scotland and constituted the basis for 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.

2.5.1.3 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 LSE. A 100km buffer around the POs was used to identify these European sites. The main screening process identified a total of 468 European sites consisting of the following:

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

2.5.1.4 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 100km.

2.5.1.5 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-NE6) is applied.

2.5.1.6 It is noted that the Scottish Government will revisit the plan-level HRA as part of its iterative plan review.

3 Project Description

3.1 Introduction

3.1.1.1 This section is intended to cover the Array Project only and will provide an outline description of it, describing activities associated with the construction, O&M and decommissioning. It will summarise the Array Project infrastructure (i.e. the 'Array Project Assets'), based on agreed design information provided by bp/EnBW, and the current understanding of the environment from survey work.

3.1.1.2 It will be comprised of various tables and diagrams to provide an overview of the Array Project that can be easily understood by the reader. It is an edited version of the full Project Description to be found in chapter 3: Project Description of the Scoping Report.

3.2 Array – Project Design Envelope Approach

3.2.1.1 This section will also provide an overview of the Project Design Envelope (PDE) approach, and how this supports the assessment of impacts through the development of the PDE. The PDE approach is standard and accepted practice for large scale energy projects such as this Array Project and has been employed for the majority of OWF applications in the UK to date.

3.2.1.2 At Application, the necessary information on site conditions and the procurement process is not available to inform the final project design. The PDE approach (also known as the 'Rochdale Envelope') (Scottish Government, 2022) will, therefore, be adopted for the Environmental Impact Assessment (EIA) Report. The PDE concept allows for some flexibility in project design options, particularly for foundations and wind turbine type, where the full details of a project are not known at application.

3.2.1.3 An example of the PDE approach would be where several types of wind turbine foundations are being considered and the assessment is based on the foundation known to have the greatest impact. In this instance, the PDE for the foundation with the greatest seabed disturbance potential would be the foundation with the largest footprint and the greatest number of wind turbines. If, after undertaking the impact assessment, it is shown that no significant effect is anticipated, it can be assumed that any project parameters equal to or less than will, therefore, also have no significant effect upon the receptors for the topic under consideration. For the Scoping Report (and subsequent EIA Report), the PDE approach has been undertaken to allow meaningful assessments of the Array Project to proceed, whilst still allowing reasonable flexibility for future project design decisions.

3.2.1.4 The PDE is distinct from the Maximum Design Scenarios (MDS) developed for the EIA Report. The PDE describes a range of parameters that apply to a project's technology design scenario (e.g. largest wind turbine option). However, each design parameter set out in this chapter is not considered independently. The MDS developed for each impact pathway has been taken from the PDE to establish the parameters (or combination of parameters) likely to result in the maximum effect. It does not follow necessarily that the largest parameters set out in this chapter comprise the MDS for any given receptor.

3.3 Offshore Infrastructure

3.3.1.1 This section will provide information on the offshore infrastructure, including wind turbines, foundations, scour protection, offshore substation platforms (OSP), inter-array cables and interconnector cables and associated infrastructure.

3.3.1.2 The key components of the Array Project will include:

- up to 191 wind turbines and associated support structures and foundations;
- up to 844km of inter-array cables and up to 751km of interconnector cables;
- up to 11 Offshore Substation Platforms (OSPs) and associated support structures and foundations.

3.3.1.3 The requirements for each design aspect are summarised in the following sections.

3.3.2 Wind Turbines

3.3.2.1 The Array Project will comprise up to 191 wind turbines. The final layout of the wind turbines will be confirmed at the detailed design stage.

3.3.2.2 The maximum blade tip height (metres (m) above Lowest Astronomical Tide (LAT)) is expected to be no greater than 390m, with a maximum rotor diameter (m) of 350m and a minimum blade tip height (m above LAT) of 30m. The PDE for the wind turbines is presented in Table 3.1 and a schematic of a typical offshore wind turbine is illustrated in Figure 3.1.

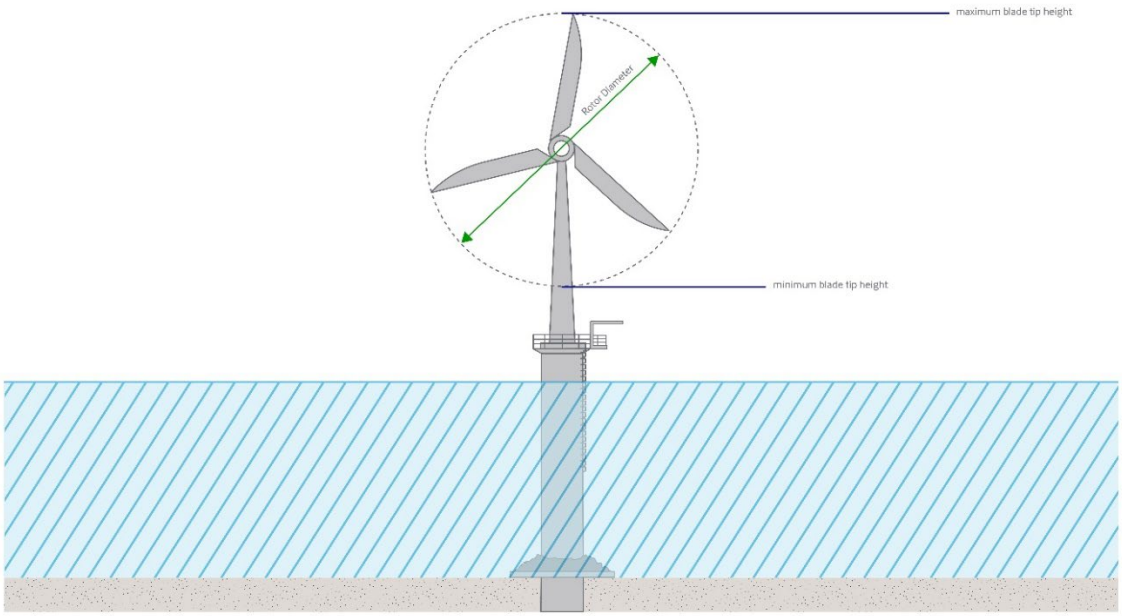

Figure 3.1: Illustrative wind turbine design

3.3.2.3 The specifics of the lighting and navigation markings on the wind turbines will be discussed with consultees post-Application.

Table 3.1: Project Design Envelope for the Array Project's wind turbines

Parameter	Maximum/ Minimum Design Parameter
Maximum number of wind turbines	191
Maximum blade tip height (m) above Lowest Astronomical Tide (LAT)	390
Minimum blade tip height (m above LAT)	30
Maximum hub height (m above LAT)	218
Maximum rotor diameter (m)	350
Minimum turbine spacing (m)	1,000

3.3.3 Offshore Substation Platforms (OSPs)

3.3.3.1 The Array Project may require up to 11 OSPs within the Scoping Boundary. These OSPs can be divided into two types: HVAC (High Voltage Alternating Current) collector substations and HVDC (High Voltage Direct Current) converter substations. The need of these and the specifications of each OSP will depend on the final electrical set up for the wind farm. Figure 3.2 illustrates a typical design of an offshore substation platform with the topside placed on a piled jacket foundation. Alternatively, the OSP topsides could be placed on monopile foundations or suction bucket jacket foundations or gravity base foundations.

3.3.3.2 The locations of the OSPs will be determined during the design phase. All OSPs will be marked for aviation and navigation purposes. The PDE for OSPs is presented in Table 3.2.

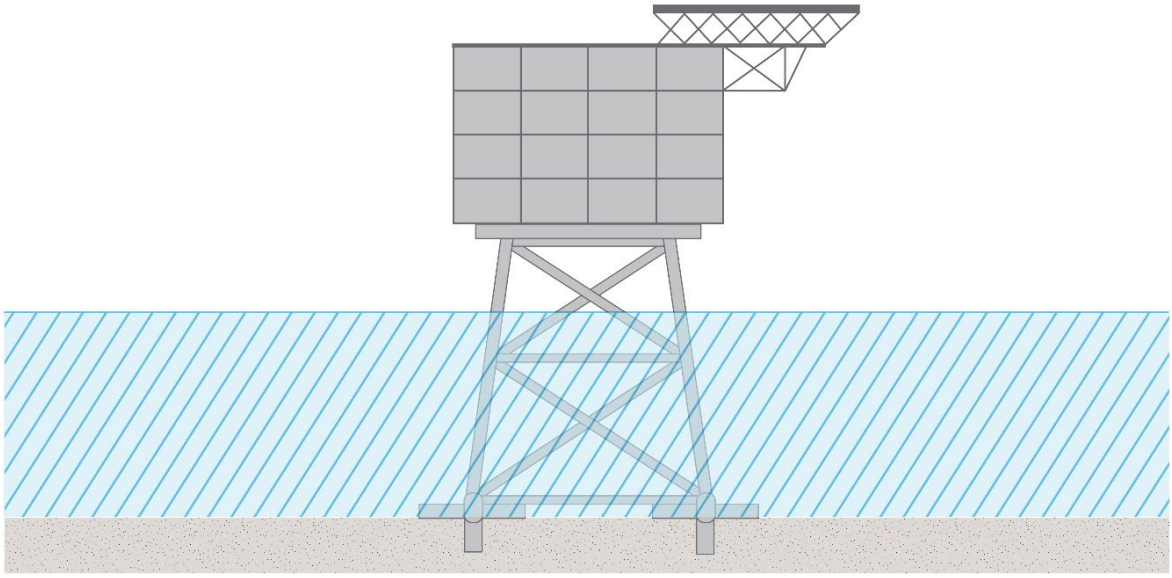

Figure 3.2: Illustrative offshore substation platform on a piled jacket foundation

Table 3.2: Project Design Envelope for offshore substation platforms

Parameter	Maximum Design Parameter for HVAC Collector Substations	Maximum Design Parameter for HVDC Converter Substations
Number of Platforms (OSPs)	8	3
Main structure height above LAT (m)	70	100
Topside length (m)	80	240
Topside width (m)	60	180

3.3.4 Foundations and Support Structures

3.3.4.1 Several foundation types will be considered for the Array Project wind turbines and OSPs:

- monopile foundations;
- gravity base foundations;
- piled jacket foundations (three or four legs for wind turbines; three, four or six legs for OSPs);
- suction bucket jacket foundations (three or four legs for wind turbines; three, four or six legs for OSPs).

3.3.4.2 The foundation type selected will depend on the environmental and pre-construction site investigation surveys and on the wind turbine selected. The foundations will be fabricated offsite, stored at a port facility or alternative dry or wet storage and transported to the Scoping Boundary for installation by specialist vessels. This section provides an overview of the design parameters associated with each proposed foundation type for both wind turbines and OSPs.

3.3.4.3 Wind turbine foundations and OSP foundations might be installed concurrently.

Monopile Foundations

3.3.4.4 Monopile foundations consist of a single steel tubular section and can come with or without a transition piece (TP). There may be ladders, a crane and other components to facilitate boat landings, or connection to the tower (Table 3.3). The TP or upper part of the monopile is typically painted yellow and marked according to relevant regulatory guidance.

3.3.4.5 Depending on soil conditions and monopile size, monopile foundations are most likely to be piled by hydraulic hammers, vibrated, or drilled and grouted. In areas of rough seabed, drilling may aid the piling process, with drilling spoil disposed of at the drill site. The installation will be done from jack-up or floating vessels/barges with the required equipment. The equipment can operate above or below the sea surface.

3.3.4.6 Up to two monopiles may be installed in a 24-hour period, with the MDS being the concurrent installation of the two monopiles. The underwater noise assessments will determine the need for noise mitigation. The PDE for monopile foundations is shown in Table 3.3 and an illustrative monopile foundation is shown in Figure 3.3.

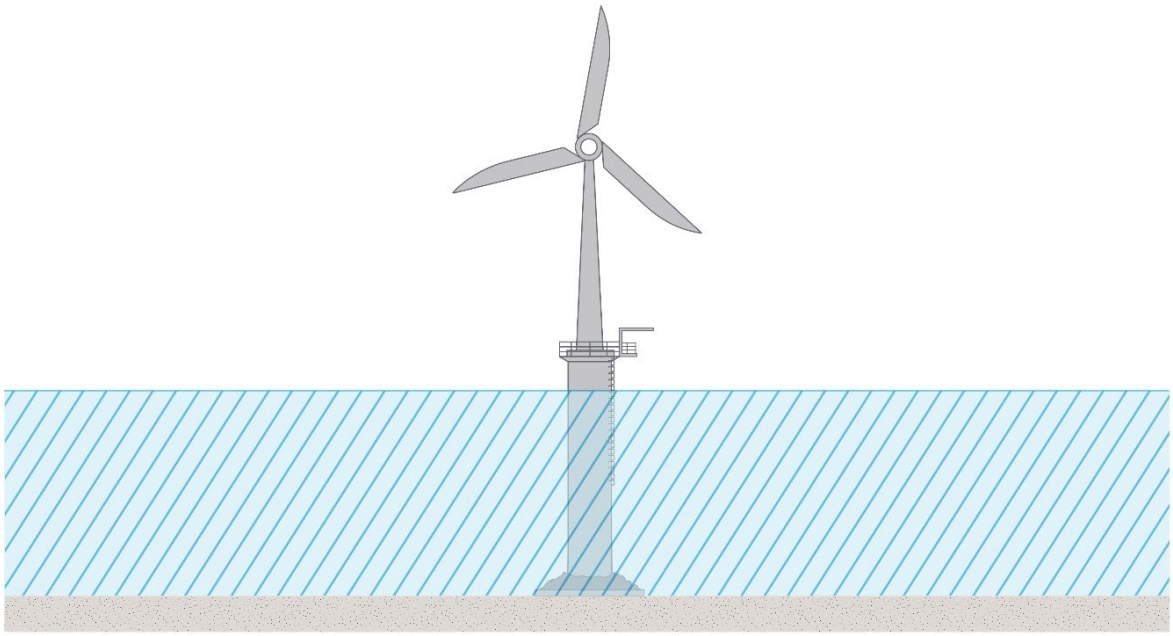

Figure 3.3: Illustrative monopile foundation design

Table 3.3: Project Design Envelope for monopile foundations

Parameter	Maximum design parameter for wind turbines	Maximum design parameter for OSPs
Number of piles requiring piling	191	26
Pile diameter (m)	19	19
Hammer energy (kJ)	7,500	7,500
Pile penetration depth (m)	70	70
Seabed footprint per pile (m^2)	300	300
Scour protection material (type)	Layers of graded stones, rock filled mesh fibre bags, pre-cast concrete block mattresses, polypropylene fronds mattresses secured by weighted perimeter or anchors	Layers of graded stones, rock filled mesh fibre bags, pre-cast concrete block mattresses, polypropylene fronds mattresses secured by weighted perimeter or anchors

Parameter	Maximum design parameter for wind turbines	Maximum design parameter for OSPs
Total seabed footprint including scour protection (m^2) (per structure/location)	5,800	13,800

Gravity Foundations

3.3.4.7 Gravity foundations are ballast weights with a conical caisson built around a monopile (Figure 3.3), which hold structures to the seabed and eliminate the requirement for drilling or piling, unless ground reinforcements with piles or suction buckets would be required to stabilise the seabed. In case of the latter, the numbers and dimensions of piles or suction buckets will not exceed the values given for piled jacket foundations or suction bucket jacket foundations. The seabed is dredged and primed with bedding material (e.g. crushed rock) to stabilise the foundation prior to installation, with excavated material disposed of on site. The PDEs for conical gravity foundations for wind turbines and HVAC collector substations are listed in Table 3.4.

3.3.4.8 Note, HVDC converter substations will not be developed via a gravity base with conical caisson and instead may be developed with gravity foundations built around a rectangular support structure, as outlined below.

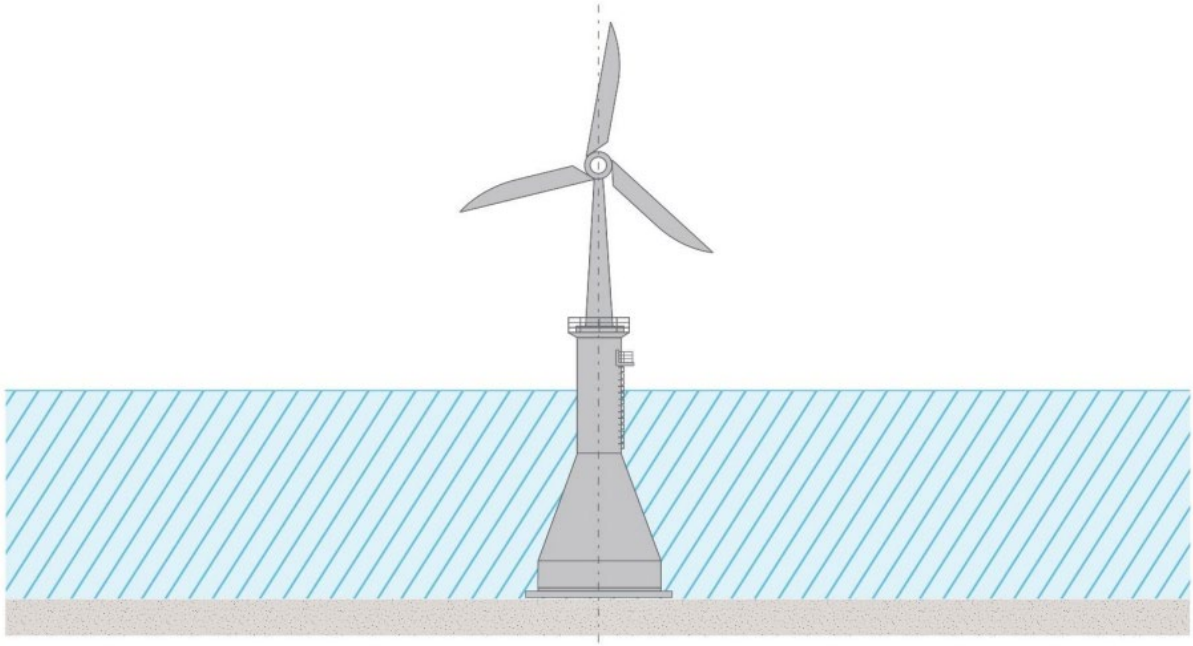

Figure 3.4: Illustrative conical gravity base foundation

Table 3.4: Project Design Envelope for conical gravity foundations for wind turbines and HVAC collector substations

Parameter	Maximum design parameter for wind turbines	Maximum design parameter for HVAC Collector Substations
Number of gravity base foundations	191	8
Foundation diameter at seabed (m)	63	63
Seabed footprint per gravity base foundation (m^2)	3,200	3,200
Scour protection material (type)	Layers of graded stones, rock filled mesh fibre bags, pre-cast concrete block mattresses, polypropylene fronds mattresses secured by weighted perimeter or anchors.	Layers of graded stones, rock filled mesh fibre bags, pre-cast concrete block mattresses, polypropylene fronds mattresses secured by weighted perimeter or anchors.
Diameter scour protection footprint (m) per foundation	230	230
Total seabed footprint including scour protection (m^2) (per foundation)	40,300	40,300

3.3.4.9 For large OSPs, such as the HVDC converter substations, gravity base foundations may be ballast weight built around a rectangular support structure with up to six legs (Figure 3.4). This eliminates the requirement for drilling or piling unless ground reinforcements with piles or suction buckets would be required to stabilise the seabed. The seabed is dredged and primed with bedding material (e.g. crushed rock) to stabilise the foundation prior to installation, with excavated material disposed of on site. The PDE for gravity base foundations for HVDC converter substations can be found in Table 3.5.

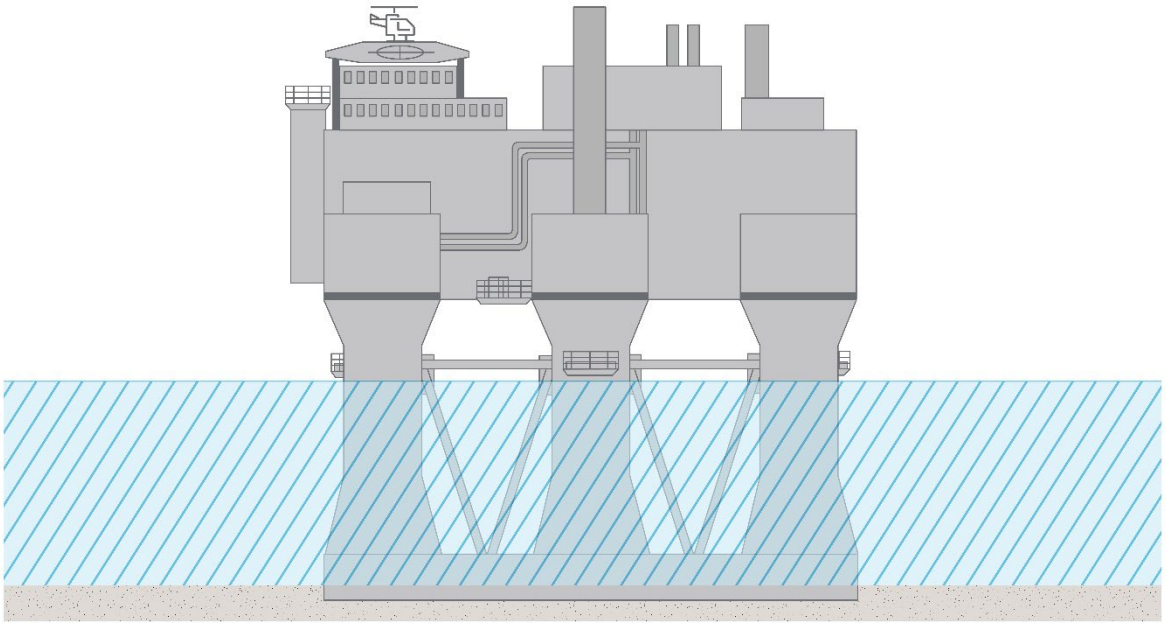

Figure 3.5: Illustrative rectangular gravity base foundation

Table 3.5: Project Design Envelope for rectangular gravity base foundations for HVDC converter substations

Parameter	Maximum design parameter for HVDC Converter Substations
Number of gravity base foundations	3
Foundation dimensions at seabed (m)	180 x 240 (rectangular)
Seabed footprint per gravity base foundation (m^2)	43,200
Scour protection material (type)	Layers of graded stones, rock filled mesh fibre bags, pre-cast concrete block mattresses, polypropylene fronds mattresses secured by weighted perimeter or anchors.
Dimension of scour protection footprint (m) per foundation	230 x 290 (rectangular)
Total seabed footprint including scour protection (m^2) (per foundation)	66,700

Piled Jacket Foundations

3.3.4.10 Piled jacket foundations are steel lattice constructions (comprising steel tubular members and welded joints) which support wind turbines or OSPs and are secured to the seabed by pin piles. The steel tubular pin piles are typically narrower than monopiles and will most likely be piled by hydraulic hammers, vibrated, or drilled into the seabed (Figure 3.5Figure 3.6).

3.3.4.11 Pin piles may be installed concurrently for wind turbines and OSPs, with the MDS assuming concurrent installation at two locations. A 'soft start' procedure will be employed, whereby the hammer strikes will commence from 15% of the maximum hammer energy up to 100% of the maximum hammer energy (if required). The PDE for piled jacket foundations for wind turbines (three and four legs) is provided in Table 3.6 and for OSPs (three, four and six legs) in Table 3.7.

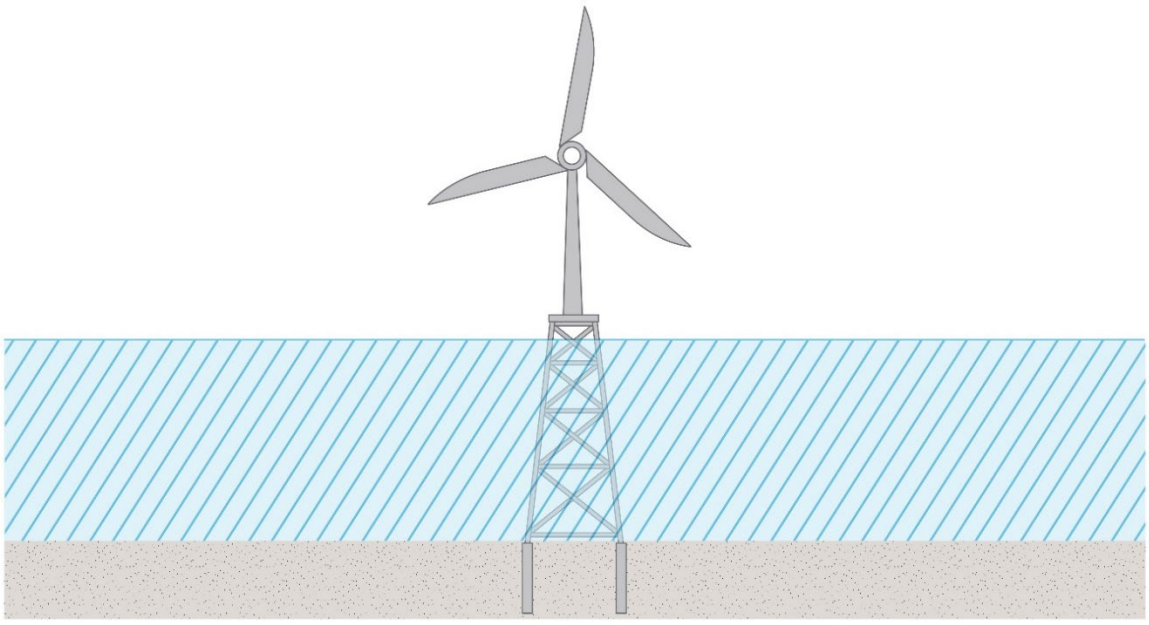

Figure 3.6: Illustrative pin pile jacket foundation design

Table 3.6: Project Design Envelope for wind turbines with pin pile jacket foundations

Parameter	Maximum design parameter (3-legged)	Maximum design parameter (4-legged)
Number of piled jacket foundations	191	191
Diameter of jacket leg (m)	5.3	5.1
Number of piles per leg	3	3
Diameter of pin piles (m)	6.2	6.0
Seabed footprint per jacket foundation (m^2)	300	400
Number of concurrent piling events	2	2
Hammer energy (kJ)	4,300	4,200
Scour protection material (type)	Layers of graded stones, rock filled mesh fibre bags, pre-cast concrete block mattresses, polypropylene fronds mattresses secured by weighted perimeter or anchors	Layers of graded stones, rock filled mesh fibre bags, pre-cast concrete block mattresses, polypropylene fronds mattresses secured by weighted perimeter or anchors
Total seabed footprint including scour protection and mud mats (m^2) (per foundation)	7,000	9,300

Table 3.7: Project Design Envelope for OSPs with pin pile jacket foundations

Parameter	Maximum design parameter (3-legged)	Maximum design parameter (4-legged)	Maximum design parameter (6-legged)
Number of piled jacket foundations	8	11	11
Diameter of jacket leg (m)	5.3	5.3	5.0
Number of piles per leg	4	4	4
Diameter of pin piles (m)	4.5	5.0	5.0
Seabed footprint per jacket foundation (m^2)	440	580	740
Number of concurrent piling events	2	2	2
Hammer energy (kJ)	3,200	3,600	3,600
Scour protection material (type)	Layers of graded stones, rock filled mesh fibre bags, pre-cast concrete block mattresses, polypropylene fronds mattresses secured by weighted perimeter or anchors	Layers of graded stones, rock filled mesh fibre bags, pre-cast concrete block mattresses, polypropylene fronds mattresses secured by weighted perimeter or anchors	Layers of graded stones, rock filled mesh fibre bags, pre-cast concrete block mattresses, polypropylene fronds mattresses secured by weighted perimeter or anchors
Total seabed footprint including scour protection and mud mats (m^2) (per foundation)	5,000	9,900	16,900

Jacket Foundations with Suction Buckets

3.3.4.12 Jacket foundations with suction buckets are steel lattice constructions (comprising tubular steel members and welded joints) fixed to the seabed by suction buckets installed below each leg of the jacket. The suction buckets are typically hollow steel cylinders, capped at the upper end and do not require a hammer or drill for installation (illustrated in Figure 3.6).

3.3.4.13 At the installation site, the jacket foundations would be lowered by crane to the seabed and water would be pumped from the bucket to suction it to the seabed. Once the bucket has penetrated the seabed to the expected depth of 25m, the pump is turned off. A thin layer of grout is then injected under the top side of the bucket to fill the void and ensure contact between the soil within the bucket, and the top of the bucket itself.

3.3.4.14 The Applicant proposes jackets with three and four legs for wind turbine foundations (Table 3.8) along with three, four, and six legs for OSP foundations (Table 3.9).

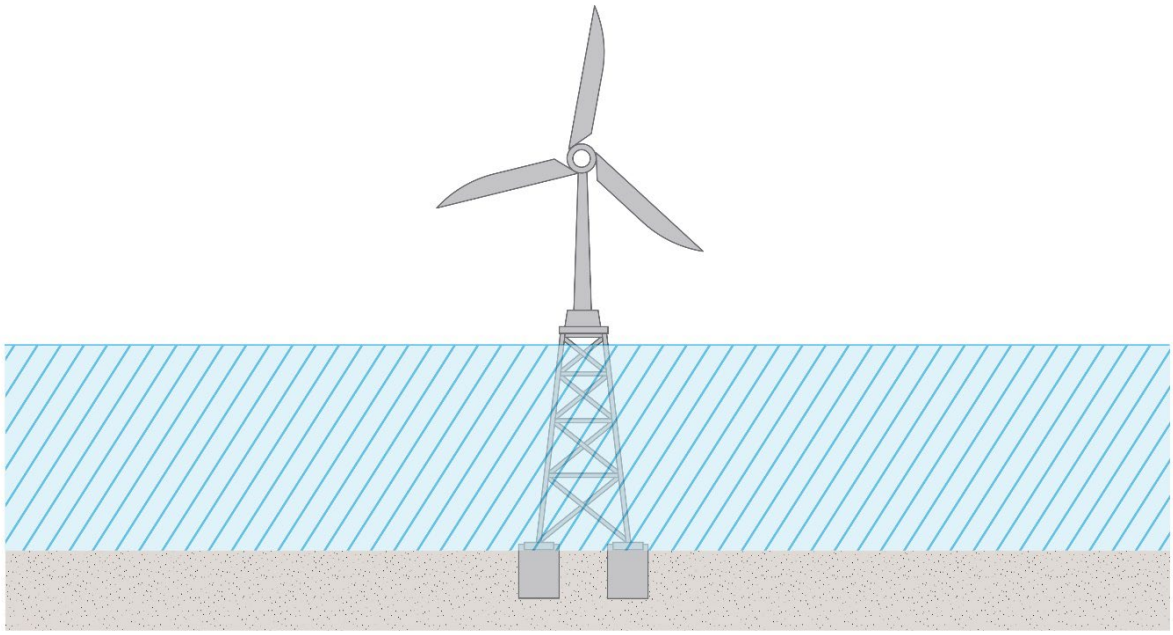

Figure 3.7: Illustrative design of jacket with suction buckets

Table 3.8: Project Design Envelope for wind turbines with suction bucket jacket foundations

Parameter	Maximum design parameter (3-legged)	Maximum design parameter (4-legged)
Number of suction bucket jacket foundations	191	191
Suction bucket diameter (m)	20	20
Diameter of jacket leg (m)	5.3	5.1
Expected bucket penetration depth (m)	25	25
Seabed footprint per jacket foundation (m^2)	950	1,300
Scour protection material (type)	Layers of graded stones, rock filled mesh fibre bags, pre-cast concrete block mattresses, polypropylene fronds mattresses secured by weighted perimeter or anchors	Layers of graded stones, rock filled mesh fibre bags, pre-cast concrete block mattresses, polypropylene fronds mattresses secured by weighted perimeter or anchors
Total seabed footprint including scour protection (m^2) (per foundation)	14,600	16,900

Table 3.9: Project Design Envelope for OSPs with suction bucket jacket foundations

Parameter	Maximum design parameter (3-legged)	Maximum design parameter (4-legged)	Maximum design parameter (6-legged)
Number of suction bucket jacket OSP foundations	8	11	11
Suction bucket diameter (m)	20	20	18
Diameter of jacket leg (m)	5.3	5.3	5.0
Expected bucket penetration depth (m)	25	25	25
Seabed footprint per jacket foundation (m^2)	950	1,300	1,600
Scour protection material (type)	Layers of graded stones, rock filled mesh fibre bags, pre-cast concrete block mattresses, polypropylene fronds mattresses secured by weighted perimeter or anchors	Layers of graded stones, rock filled mesh fibre bags, pre-cast concrete block mattresses, polypropylene fronds mattresses secured by weighted perimeter or anchors	Layers of graded stones, rock filled mesh fibre bags, pre-cast concrete block mattresses, polypropylene fronds mattresses secured by weighted perimeter or anchors
Total seabed footprint including scour protection (m^2) (per foundation)	14,300	22,500	26,600

3.3.5 Seabed Preparation

3.3.5.1 Seabed preparation will be required prior to foundation and cable installation. Seabed preparation may include seabed levelling and removing surface and subsurface debris such as boulders, fishing nets or lost anchors. If debris is present below the seabed surface, then excavation may be required for access and removal.

3.3.5.2 If the final location of the Array Project infrastructure crosses any out-of-service cables, these may be removed. Any cable removal will be undertaken in consultation with the asset owner and in accordance with the International Cable Protection Committee (ICPC) guidelines (2011).

3.3.5.3 A dedicated Unexploded Ordnance (UXO) survey and a risk strategy will seek to reduce UXO risk. UXO may be avoided via re-routing, micro-siting, or cleared via identification and removal methodologies. Regarding inter-array cables and interconnector cables, the UXO clearance corridor will include a 20m buffer to each side of the 20m corridor (given as width of seabed corridor (disturbance) from installation tool in Table 3.10 and Table 3.11).

3.3.6 Scour Protection

3.3.6.1 The wind turbine and OSP foundation structures may be susceptible to seabed erosion and 'scour hole' formation due to natural hydrodynamic and sedimentary processes. The development of scour is influenced by the shape of the foundation structure, seabed sedimentology and site specific Metocean conditions e.g. currents and current direction.

3.3.6.2 Scour may be mitigated with the use of scour protection. The scour protection requirements vary according to soil conditions and foundation types considered. Scour protection may include:

- layers of graded stones;
- rock filled mesh fibre bags;
- pre-cast concrete block mattresses;
- polypropylene fronds mattresses secured by weighted perimeter or anchors.

3.3.7 Inter-Array Cables

3.3.7.1 Inter-array cables (IAC) will carry electrical current produced by the wind turbines to the OSPs. Several wind turbines are typically grouped on the same cable 'string' to connect the wind turbines to an OSP, with multiple cable 'strings' connecting back to each OSP. Depending on the final design of the array cable layout, there may be an IAC back link introduced to connect wind turbines at the end of two strings, allowing for partial rerouting of power in case of cable failure. The inter-array cables will be buried wherever possible. Where burial is not achievable (for example, when the cable crosses existing cables, pipelines, or bedrock, or at the entry to the foundation) cables will be protected with rock dumping, rock bags, mattresses secured by weighted perimeter or anchors, Cable Protection Systems, and/or bend restrictors/stiffeners.

3.3.7.2 Inter-array cables may be installed by pre-lay plough, plough, trenching, cutting and/or jetting. Each technique involves the displacement of sediments by mechanical tools or water jets on or above the seabed, which enable the cable to be lowered into a trench below the seabed. The PDE for inter-array cables is shown in Table 3.10.

Table 3.10: Project Design Envelope for inter-array cables

Parameter	Maximum design parameter
Inter-array cable length (km)	844
External cable diameter (mm)	299
Number of cables	205
Target burial depth (m)	1
Width of seabed disturbance from installation tool (m)	20
Total area of seabed disturbance for inter-array cables (km^2)	17
Cable protection material (type)	Burial, rock dump, rock bags, mattressing, CPS, bend restrictors/stiffeners
Cable protection height x width (m)	3 x 10

3.3.8 Interconnector Cables

3.3.8.1 Interconnector cables will connect the OSPs to other OSPs within the Scoping Boundary. Interconnector cables will be buried wherever possible. Where burial is not achievable (for example, when the cable crosses existing cables, pipelines, or bedrock, or at the entry to the foundation) cables will be protected with rock dumping, rock bags and or mattresses secured by weighted perimeter or anchors, Cable Protection Systems and/or bend restrictors/stiffeners.

3.3.8.2 Interconnector cables will be installed by the same methods proposed for inter-array cables in section 3.3.7.2. The PDE for interconnector cables is provided in Table 3.11.

Table 3.11: Project Design Envelope for interconnector cables

Parameter	Maximum design parameter
Number of interconnector cables within OWF array	30
External cable diameter (mm)	322
Total length of interconnector cables (km)	751
Target burial depth (m)	1
Width of seabed disturbance from installation tool (m)	20
Total area of seabed disturbance for interconnector cable route (km^2)	15
Cable protection material (type)	Burial, rock dump, rock bags, mattressing, CPS, bend restrictors/stiffeners
Cable protection height x width (m)	3 x 10

3.4 Construction

3.4.1.1 This section will provide a high-level overview of activities associated with the construction phase.

3.4.1.2 The construction of the Array Project is estimated to occur over a duration of up to seven years. Table 3.12 provides an indication of the expected major construction activities.

Table 3.12: Indicative construction activities for the Array Project

Activity	Description
Pre-construction surveys	Geotechnical and geophysical surveys, boulder and UXO surveys
Seabed preparation activities	Seabed preparation activities (e.g., rock picking, sand wave levelling and clearance (pre-lay plough/dredging), pre-lay grapnel run, UXO clearance, and removal of third party or out of service cables) to aid installation of wind turbine and OSP foundations, inter-array cables and interconnector cables.
Foundations installation	Installation of wind turbine and OSP foundations.
Offshore substation platform installation and commissioning	Installation of OSPs and associated equipment required for this infrastructure, including commissioning.
Interconnector cables installation	Installation of interconnector cables, connecting OSPs to OSPs.
Inter-array cables installation	Installation of inter-array cables, connecting wind turbines to wind turbines or to OSPs throughout the Scoping Boundary.
Wind turbine installation and commissioning	Installation of the wind turbines onto the previously installed wind turbine foundations, including commissioning.
Post-construction as-built surveys	Surveys to document what has been constructed.

3.4.1.3 The construction of the Array Project will be supported by various construction vessels, including but not limited to main installation and support vessels, tug/anchor handlers, cable lay installation and support vessels, heavy lift vessels, supply vessels, jack-up vessels, guard vessels, survey vessels, seabed preparation vessels, crew transfer vessels, scour protection installation vessels and cable protection installation vessels.

3.4.1.4 A maximum of 166 construction vessels and twelve helicopters could be used on site at any one time during the construction phase.

3.4.1.5 Wind turbines, foundations, and offshore structures will be produced on land and transported to the Scoping Boundary, via installation vessels. At the Scoping Boundary, various foundations will be installed according to the conditions on site. The wind turbine towers are typically set in place first, followed by the nacelle and blades. Once fully installed and connected through relevant cables, testing will start to begin the commissioning process.

3.5 Operations and Maintenance

3.5.1.1 Throughout the lifetime of the Array Project, routine and non-routine O&M works will be undertaken. Routine maintenance activities may include inspections, removal of marine growth build up, minor repairs, cleaning activities and the replacement of consumables and corrosion protection systems. Non-routine major maintenance activities may include component exchanges and replacement of infrastructure and equipment (e.g. wind turbine blades, gearboxes and interconnector and inter-array cables), scour protection and cable protection replenishment or replacement, cable reburial and cable repair activities, painting and other coating works, replacement of access ladders and geophysical survey.

3.5.1.2 Up to 3,545 return vessel trips per year are estimated for the Array Project's O&M phase, including crew transfer vessels, jack-up vessels, cable repair vessels, service operation vessels, excavators or backhoe dredgers and other similar vessels. Helicopters may also be used to transport personnel and equipment. Additionally, drones may be used e.g. for inspections or to transport equipment.

3.5.1.3 The details of estimated annual and total O&M activities will be specified within the EIA Report.

3.6 Decommissioning and Repowering

3.6.1.1 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. Regulators will issue a Section 105 notice to developers, post issue of the consent or marine licence for the given development. The offshore renewable energy developer is required to subsequently provide a detailed plan of decommissioning works, which includes an overview of the anticipated cost and financial securities. This plan should adhere to good industry practice, guidance and legislation relating to decommissioning at that time. The plan will be consulted on by an approved set of stakeholders and will be publicly available.

3.6.1.2 The EIA Report will present further information on the anticipated decommissioning events and an assessment of the potential significant effects of this phase on receptors.

3.6.1.3 It is also possible that the lifetime of the Array Project's generation assets will be extended through repowering, subject to the relevant consenting and licensing regime in place at that time.

4 Identification of European sites and Features

4.1.1.1 This section identifies a list of European sites (including Ramsar Sites), and their relevant qualifying features, which have been identified based on the potential for connectivity with the Array Project. The identification of these sites has been carried out using the criteria outlined in Table 2.1. The identified European sites are taken forward for determination of LSE in section 5.

4.1.1.2 Each of the following receptor groups are considered in turn:

- Annex I habitats (offshore and coastal) (section 4.2);
- Annex II diadromous fish species (section 4.3);
- Annex II marine mammals (section 4.4);
- marine ornithological features (section 4.5).

4.2 Sites Designated for Annex I habitats (offshore and coastal)

4.2.1 European Site Identification for Annex I habitats (offshore and coastal)

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

4.2.1.2 The approach adopted focuses on the Annex I habitat qualifying interest features for which there is a potential for impact as a result of the Array Project.

Criterion 1

4.2.1.3 There are no European sites with relevant qualifying Annex I habitats that overlap with the Array Project; therefore, no sites are screened in for further consideration on the basis of criterion 1 (outlined in Table 2.1).

Criterion 2

4.2.1.4 There are no European sites that meet criterion 2, which refers to mobile features whose range (e.g. foraging, migratory, overwintering, breeding or natural habitat range) overlaps with the Array Project, (outlined in Table 2.1) for Annex I habitats. Annex I habitats are sessile, therefore, do not have foraging ranges that may overlap with the Array Project. No sites are screened in for further consideration on this basis.

Criterion 3

4.2.1.5 There is the potential for indirect effects to sites designated for Annex I habitats, as a result of the impact increases in suspended sediment concentrations (SSC) and associated deposition. However, based on the information provided in chapter 7.1: Physical Processes of the Scoping Report, increases in SSC and associated deposition are likely to be localised and limited to within the footprint of the Array Project.

4.2.1.6 One spring tidal excursion is defined as the distance that suspended sediment is transported before being carried back on the returning tide. Therefore, one tidal excursion has been used to estimate the spatial extent of indirect effects of increased SSC and associated deposition associated with the Array Project. One spring tidal excursion of between circa 5.5km and 13.5km from the Scoping Boundary has been identified through interim numerical modelling techniques. For the purposes of this HRA Stage 1 Screening Report, a precautionary approach has been adopted and a 20km buffer for indirect effects on Annex I habitats has been applied. This buffer is considered to be sufficiently precautionary to capture all European sites within the ZoI for indirect effects associated with the Array Project.

4.2.1.7 There are no European sites with Annex I habitat qualifying features that meet this criterion. Therefore, no sites have been screened in for further consideration on this basis.

4.2.2 Summary of European Sites Identified for Annex I habitats (offshore and coastal)

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

4.3 European Sites Designated for Annex II Diadromous Fish

4.3.1 European Site Identification for Annex II Diadromous Fish

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

4.3.1.2 The approach adopted for this HRA Stage 1 Screening Report focuses on the Annex II diadromous fish qualifying interest features for which there is considered to be a potential for impact as a result of the Array Project.

4.3.1.3 Based on a review of key desktop sources and the summary of the baseline environment undertaken in chapter 8.2: Fish and Shellfish Ecology of the Scoping Report, the following Annex II diadromous fish and shellfish species have the potential to occur within the vicinity of the Array Project and are considered in the HRA Stage 1 Screening Report:

- Atlantic salmon (*Salmo salar)*.
- Freshwater pearl mussel (*Margaritifera margartitifera)* (this species has the potential to be indirectly impacted through potential impacts on Atlantic salmon due to its symbiotic relationship with Atlantic salmon, where Atlantic salmon are a host species during a critical phase of the mussel's lifecycle).

4.3.1.4 River lamprey's (*Lampetra fluviatilis)* marine phase of life cycle is restricted to coastal/estuarine waters, with the closest SAC designated for river lamprey, the Tweed Estuary SAC, approximately 108km from the Array Project. Given the location of the Array Project approximately 60km from the Aberdeenshire coastline, there is no connectivity between this species and activities associated with the Array Project and, as a result, this species has not been considered further in this HRA Stage 1 Screening Report.

4.3.1.5 Sea lamprey's (*Petromyzon marinus)* marine phase of life cycle is also restricted to coastal/estuarine waters, although the marine distribution is currently uncertain. The closest site designated for sea lamprey is the Tweed Estuary SAC, which is located approximately 108km from the Array Project. Considering the above and given the low sensitivity of sea lamprey to underwater sound, it is unlikely that the Array Project will have an adverse effect on any European sites designated for this species. Therefore, this species has also not been considered further in this Stage 1 Screening Report.

Criterion 1

4.3.1.6 There are no European sites with Annex II diadromous fish species as qualifying features that overlap with the Array Project; therefore, no European sites are screened in for further consideration for diadromous fish on the basis of this criterion.

Criterion 2

4.3.1.7 There is the potential for activities associated with the Array Project to result in impacts on Annex II diadromous fish species at a distance from the European sites for which they are qualifying interest features. This is on the basis that these species are highly mobile and utilise both freshwater and marine environments throughout their life cycles.

4.3.1.8 A precautionary approach to the identification of European sites has, therefore, been adopted in order to capture all European sites with the potential for connectivity with the Array Project and, in particular, to consider the potential for disruption to migration (i.e. barriers to migration) of diadromous fish to/from natal rivers (river of origin).

4.3.1.9 For the purposes of this HRA Stage 1 Screening report, a precautionary approach has been adopted by applying a preliminary buffer of 100km from the Array Project for all features outlined in section 4.3.1.3 alongside information on known migratory routes for key species.

Atlantic salmon and freshwater pearl mussel

4.3.1.10 Recent evidence from research looking into Atlantic salmon migration from rivers in the Moray Firth suggest that smolts head north and directly across the North Sea relatively rapidly, rather than moving in a southern/coastal direction upon leaving their natal rivers (Newton *et al.,* 2017 and Marine Scotland Science, 2019). 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). Evidence from an Atlantic salmon smolt tagging study conducted by Marine Scotland (2019b) also indicated a strong directional movement heading east/northeast out of several rivers in the Moray Firth (Conon, Deveron, Findhorn, Ness, Oykel, Shin and Spey).

4.3.1.11 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 (Malcolm *et al.*, 2010; ABPmer, 2014 and The Crown Estate, 2019)).

4.3.1.12 Based on the information provided above and considering the location of the Array Project in relation to the predominant migration routes, barriers to Atlantic salmon migrating to and from SACs flowing into the Moray Firth are considered to be very low. 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. All SACs for Atlantic salmon (and freshwater pearl mussel, see paragraph 4.3.1.3) located south of Fraserburgh and the Moray Firth have been screened in and all sites north of this, and within the Moray Firth itself, have been screened out.

4.3.1.13 Six European sites have been screened in using this criterion and must, therefore, be taken forward for determination of LSE in section 1.4.4. These are:

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

Criterion 3

4.3.1.14 Given the precautionary approach taken and the large buffer proposed for criterion 2 (paragraph 4.3.1.9), (i.e., broadly using a 100km buffer from the Array Project, but screening in all SAC rivers flowing into the Firth of Forth), the ZoI for key impacts to Annex II diadromous fish features (i.e., underwater sound, habitat loss and increased SSC) are anticipated to be well within this range. No additional European sites with Annex II diadromous fish as qualifying features, beyond those already identified for criterion 2, are thus screened in for further consideration on the basis of criterion 3.

4.3.2 Summary of European Sites Identified for Annex II Fish and Shellfish Features

4.3.2.1 The initial screening process has identified six European sites with Annex II diadromous fish species as qualifying features to be taken forward for detailed determination of LSE in section 5 of this report. The European sites identified are listed in Table 4.1 and illustrated in Figure 4.1.

Table 4.1: European sites designated for Annex II diadromous fish (and associated) species taken forward for the determination of LSE

European site	Relevant Annex II features identified through initial screening of sites	Distance to OWF Project	Additional offshore qualifying features
River Dee SAC	Atlantic salmon Freshwater pearl mussel	63.5	Otter[4]
River South Esk SAC	Atlantic salmon Freshwater pearl mussel	82	Not Applicable
River Tweed SAC	Atlantic salmon	113	Brook lamprey[5] River lamprey[6] Otter[5] Sea lamprey [7]
River Tay SAC	Atlantic salmon	136	Brook lamprey[6] River lamprey[7] Otter[5] Sea lamprey [8]
River Teith SAC	Atlantic salmon	218	Brook lamprey[6] River lamprey[7] Sea lamprey[8]

[4] Otter (*Lutra lutra)* is also a feature of this site but has been screened out 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 Project and the coast (approximately 60km).

[5] Other features such as brook lamprey (*Lampetra planeri)* and bullhead (*Cottus gobio)* are not diadromous fish species (i.e. they are confined to the freshwater section of the river and do not migrate to the marine environment). There is no potential for connectivity with the Array Project and the features are screened out.

[6] River lamprey is screened out of the assessment, see paragraph 4.3.1.4.

[7] Sea lamprey is screened out of the assessment, see paragraph 4.3.1.5.

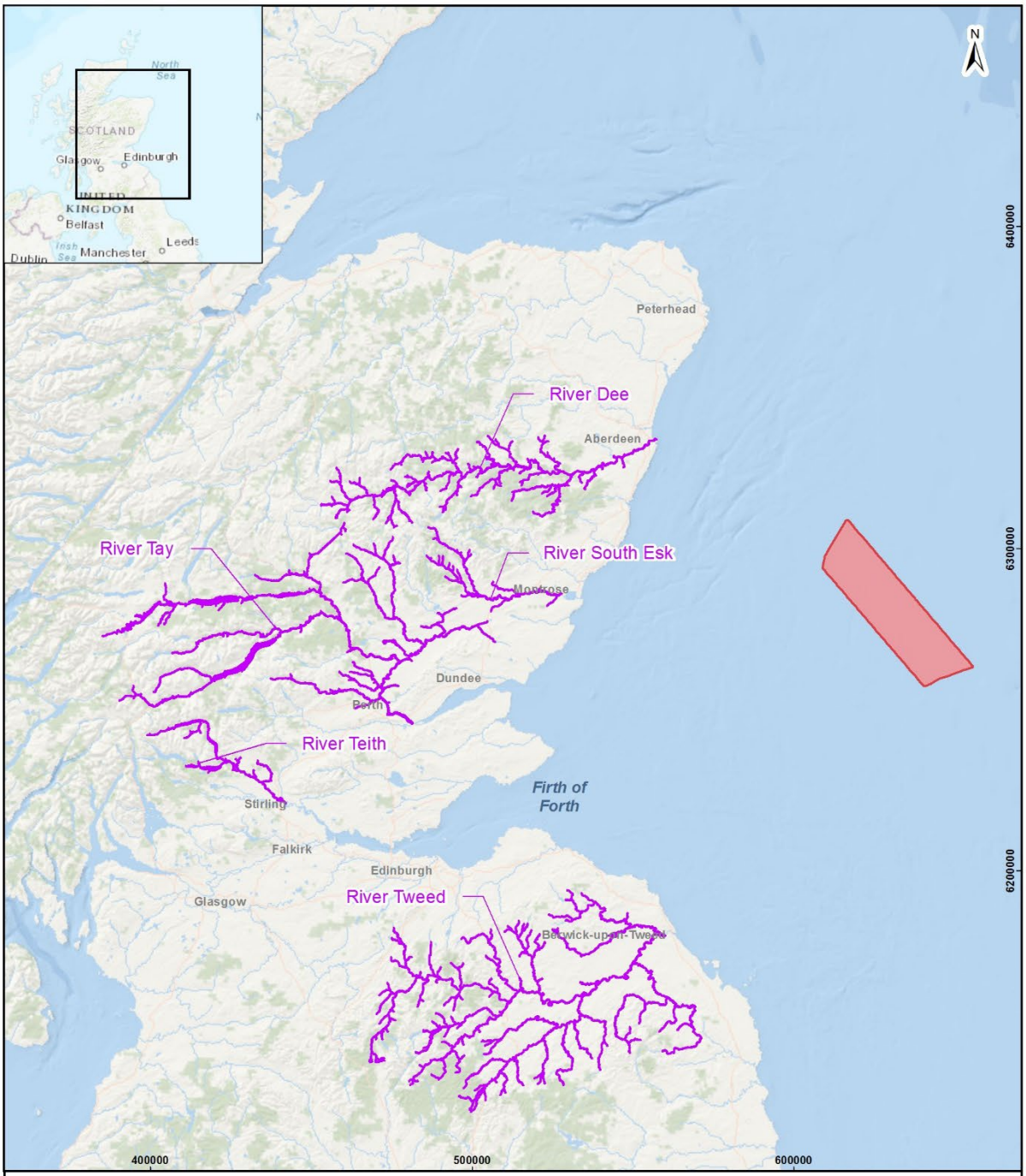

Figure 4.1: Location of the European sites with Annex II diadromous fish features to be taken forward for the determination of LSE

4.4 Sites Designated for Annex II Marine Mammal Features

4.4.1 European Site Identification for Annex II Marine Mammal Features

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

4.4.1.2 The approach adopted for this HRA Stage 1 Screening Report focuses on the Annex II marine mammal qualifying interest features for which there is considered to be a potential for LSE as a result of the Array Project.

4.4.1.3 Based on a review of key desktop sources undertaken in chapter 8.3: Marine Mammals of the Scoping Report and initial data collected during site-specific (aerial surveys), the following Annex II marine mammal species are considered to have the potential to occur within the vicinity of the Array Project. As a result, they are considered in this HRA Stage 1 Screening:

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

4.4.1.4 The Annex II species European otter (*Lutra lutra)*, primarily forages in coastal areas within 80m of the shoreline (Kruuk *et al.*, 2006). Due to the distance between the Array Project and the coast of Aberdeenshire (approximately 60km) there is no connectivity between the Array Project and this species; therefore, it is not considered further within this HRA Stage 1 Screening Report.

Criterion 1

4.4.1.5 There are no European sites with Annex II marine mammal species as qualifying features that overlap with the Array Project. Therefore, no European sites are screened in for further consideration for marine mammals on the basis of this criterion.

Criterion 2

4.4.1.6 Marine mammals are highly mobile species, which can forage over extensive areas. Therefore, there is the potential for activities associated with the Array Project to result in impacts on Annex II marine mammal species at large distances from the European sites for which they are qualifying interest features. The following sections present the relevant ranges considered for the Annex II marine mammal features identified in paragraph 4.4.1.3.

<u>Bottlenose dolphin</u>

4.4.1.7 There are two different ecotypes for bottlenose dolphin in Scottish waters: the wide-ranging offshore ecotype and the philopatric coastal ecotype (Louis *et al.,* 2014). Coastal ecotypes are concentrated mostly within distinct populations in the west and east coast of Scotland, namely the Moray Firth and the Firth of Tay (Hague *et al.,* 2020; Cheney *et al.,* 2013). These coastal ecotypes are primarily limited to coastal waters and are, as a result, unlikely to overlap with the Marine Mammal Study Area. There is less certainty in the distribution and abundance of the offshore ecotypes (Cheney *et al.,* 2013).

4.4.1.8 The Array Project is located within the Greater North Sea (GNS) Management Unit (MU) for bottlenose dolphin (IAMMWG, 2022). The abundance of bottlenose dolphin in the GNS MU is estimated at 2,022 individuals (CV (coefficient of variation) of 0.75), equating to a density of 0.003 individuals per km^2 (IAMMWG, 2022).

4.4.1.9 The identification of relevant European sites designated for Annex II bottlenose dolphin features was undertaken using a precautionary approach to capture all sites with potential connectivity to the Array Project, as outlined in criterion 2. On this basis, it is considered that all sites with bottlenose dolphin as a qualifying interest feature located within the GNS MU could potentially be affected and are, therefore, taken forward for determination of LSE. On this basis, only the Moray Firth SAC has been screened in for Annex II bottlenose dolphin features.

Harbour porpoise

4.4.1.10 The harbour porpoise has a large population and is extensively distributed throughout the North Sea, where it is the most abundant cetacean species (JCDP 2023; Hammond *et al.*, 2021; Evans and Waggitt, 2020; Chevallard *et al.*, 2019). The Array Project is located within the North Sea MU for harbour porpoise (IAMMWG, 2022), which is estimated to have an abundance of 346,601 individuals (CV: 0.09; 95% CI (confidence interval): 289,498 – 419,967) based on estimates from the Small Cetaceans in the European Atlantic and North Seas (SCANS) III survey (Hammond *et al.*, 2021). Given the sightings recorded during the site specific aerial surveys (more information is provided in chapter 8.3: Marine Mammals, of the Scoping Report), and from previous surveys at nearby OWF sites, harbour porpoise is likely to occur year-round within the Marine Mammal Study Area and wider potential ZoIs.

4.4.1.11 The identification of relevant European sites designated for Annex II harbour porpoise features was undertaken using a precautionary approach in order to capture all sites with potential connectivity to the Array Project, as outlined in criterion 2. On this basis, it is considered that all sites with harbour porpoise as a qualifying interest feature located within the North Sea MU could potentially be affected and are, therefore, taken forward for determination of LSE. A total of 20 European sites designated for harbour porpoise have been screened in using this criterion.

Grey seal

4.4.1.12 During pre-Scoping consultation NatureScot advised that for grey seal a preliminary screening buffer of 20km for Scottish SACs should be applied for inclusion in the assessment of LSE. This reflects the fact that these SACs are designated for breeding colonies of grey seal and during the breeding season grey seal generally stay within 20km of the breeding colony (advice received during the Scoping Workshop, see Table 1.1). NatureScot considers this to be the key season relevant to this HRA.

4.4.1.13 However, grey seals can forage up to 100km from their haul out sites and it is possible that site specific seal haul out data and telemetry data, which has not yet been obtained, could show connectivity of seal sites beyond 20km with the Array Project. To ensure a precautionary approach, a secondary step in identifying relevant European sites has also been used using Seal Management Units. The Array Project is located within the East Scotland Seal MU and is within the vicinity of the Northeast England Seal MU and the Moray Firth Seal MU. Thus, any European sites that are located within the same Seal MU as the Array Project (i.e. the East Scotland Seal MU) have been considered for screening at this stage. Due to the proximity to the other seal MUs, connectivity between the Array Project and the Northeast England Seal MU and the Moray Firth Seal MU has also been considered. On this basis, the Berwickshire and North Northumberland Coast SAC and the Isle of May SAC are also considered.

4.4.1.14 The HRA Stage 1 Screening Report will be updated once seal haul out count data and telemetry data has been provided to ensure any connectivity with additional SACs that have not already been identified are included for consideration.

Harbour seal

4.4.1.15 In addition to grey seal above, a screening range has also been applied to identify sites for inclusion in the assessment of LSE for harbour seal which is based on the typical foraging range of this species. Harbour seal tend to make relatively short foraging trips from haul out sites and the latest Special Committee on Seal (SCOS) report (SCOS, 2020) states that harbour seal typically forage at distances of 40km to 50km from haul out sites. No European sites for Annex II harbour seal were identified within this range.

4.4.1.16 As above for harbour seal (see paragraph 4.4.1.13), all European sites designated for harbour seal that are located within the same Seal MU as the Array Project (i.e. the East Scotland Seal MU) will be considered for screening. Connectivity between European sites in nearby Seal MUs, e.g. Northeast England Seal MU and the Moray Forth Seal MU, will also be considered. The Dornoch Firth and Morrich More SAC is located within the Moray Firth SAC. However, considering the distance to this SAC from the Array Project (219.57km), in relation to the foraging range of the harbour seal outlined in paragraph 4.4.1.15 only the Firth of Tay and Eden Estuary SAC (designated for harbour seal) has been identified for further consideration at LSE Screening.

4.4.1.17 Seal haul out count data and telemetry data in relation to the Array Project has not yet been produced. However, the HRA Stage 1 Screening Report will be updated once this has been provided to ensure

any connectivity with additional SACs that have not already been identified are included for consideration.

Criterion 3

4.4.1.18 Given the large spatial scales defined in Criterion 2 for bottlenose dolphin, harbour porpoise, grey seal and harbour seal, the ZoIs of key impacts (such as elevated underwater sound and changes to prey availability) are considered likely to be well within the areas defined in Criterion 2. No further European sites with Annex II marine mammals as qualifying features have been screened in for further consideration under Criterion 3.

4.4.2 Summary of European Sites Identified For Annex II Marine Mammal Features

4.4.2.1 The initial screening process has identified 24 European sites with Annex II marine mammal features as qualifying features to be taken forward for detailed determination of LSE in section 5 of this report. The European sites identified are listed in Table 4.2 and illustrated in Figure 4.1.

Table 4.2: European sites designated for Annex II marine mammal species taken forward for the determination of LSE

European site	Relevant Annex II marine mammal features	Distance to Scoping Boundary (km)	Additional offshore qualifying features
UK			
Firth of Tay and Eden Estuary SAC	Harbour seal	95.9	Estuaries Sandbanks which are slightly covered by sea water all the time Mudflats and sandflats not covered by seawater at low tide
Berwickshire and North Northumberland Coast SAC	Grey seal	97.2	Mudflats and sandflats not covered by seawater at low tide Large shallow inlets and bays Reefs Submerged or partially submerged sea caves
Isle of May SAC	Grey seal	104.6	Reefs
Southern North Sea SAC	Harbour porpoise	135	Not Applicable
Moray Firth SAC	Bottlenose dolphin	182	Sandbanks which are slightly covered by sea water all the time
Germany			
Doggerbank SCI	Harbour porpoise	272.8	Harbour seal Fulmar (*Fulmarus glacialis)* Gannet (*Morus bassanus)* Kittiwake (*Rissa tridactyla)*
Sylter Außenriff SCI	Harbour porpoise	460	Sandbanks which are slightly covered by sea water all the time Reefs Twaite shad (*Alosa fallax)* Black-throated loon (*Gavia arctica)* Red-throated diver *(Gavia stellata)* Grey seal River lamprey Common gull *(Larus canus)* Lesser black-backed gull *(Larus fuscus)* Great black-backed gull *(Larus marinus)*

European site	Relevant Annex II marine mammal features	Distance to Scoping Boundary (km)	Additional offshore qualifying features
			Little gull *(Larus minutus)* Gannet Harbour seal Kittiwake (*Rissa tridactyla)* Common tern *(Sterna hirundo)* Arctic tern *(Sterna paradisaea)* Sandwich tern *(Sterna sandvicensis)* Guillemot (*Uria aalge)*
Borkum-Riffgrund SCI	Harbour porpoise	500	Black-throated loon Red-throated diver Common gull Great black-backed gull Little gull Gannet Kittiwake Common tern Artic tern Sandwich tern Twaite shad Grey seal
Östliche Deutsche Bucht SCI	Harbour porpoise		Razorbill Fulmar Black-throated loon Red-throated diver Herring gull Common gull Great black-backed gull Little gull Black-headed gull

European site	Relevant Annex II marine mammal features	Distance to Scoping Boundary (km)	Additional offshore qualifying features
			Gannet Kittiwake Common tern Arctic tern Sandwich tern Twaite shad River lamprey Grey seal Harbour seal Sandbanks which are slightly covered by sea water all the time Reefs
Nationalpark Niedersächsisches Wattenmeer SAC	Harbour porpoise	543.8	Twaite shad River lamprey Sea lamprey Fen orchid Narrow mouthed whorl snail Harbour seal
NTP S-H Wattenmeer und angrenzende Küstengebiete SAC	Harbour porpoise	555.7	Sandbanks which are slightly covered by sea water all the time Estuaries Mudflats and sandflats not covered by seawater at low tide Large shallow inlets and bays Reefs Spartina swards (*Spartinion maritimae)* Salicornia and other annuals colonizing mud and sand Humid dune slacks Twaite shad Houting (*Coregonus oxyrinchus)* Grey seal River lamprey

European site	Relevant Annex II marine mammal features	Distance to Scoping Boundary (km)	Additional offshore qualifying features
			Otter Sea lamprey Harbour seal
Helgoland mit Helgoländer Felssockel SAC	Harbour porpoise	583.6	Grey seal Harbour seal Large shallow inlets and bays Reefs
Steingrund SAC	Harbour porpoise	590.7	Sandbanks which are slightly covered by sea water all the time Estuaries Mudflats and sandflats Large shallow inlets and bays Reefs Atlantic salt meadows Submerged sea caves Grey seal Otter
Hamburgisches Wattenmeer SAC	Harbour porpoise	620	Mudflats and sandflats not covered by seawater at low tide Coastal lagoons Large shallow inlets and bays Salicornia and other annuals colonizing mud and sand Spartina swards Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) Allis shad River lamprey Sea lamprey Grey seal Harbour seal
Unterweser SCI	Harbour porpoise	665	Twaite shad

European site	Relevant Annex II marine mammal features	Distance to Scoping Boundary (km)	Additional offshore qualifying features
			River lamprey Sea lamprey Atlantic salmon Harbour seal
Unterelbe SCI	Harbour porpoise	652	Estuaries Mudflats and sandflats Atlantic salt meadows Twaite shad River lamprey Sea lamprey Atlantic salmon Houting Asp (*Aspius aspius)* Lange *(Oenanthe conioides)* Harbour seal
Denmark			
Sydlige Nordsø SAC	Harbour porpoise	465.8	Sandbanks which are slightly covered by sea water all the time Grey seal Harbour seal
Gule Rev SAC	Harbour porpoise	517.4	Reefs
Vadehavet med Ribe Å, Tved Å og Varde Å vest for Varde SAC	Harbour porpoise	538.6	Sandbanks which are slightly covered by sea water all the time Estuaries Mudflats and sandflats not covered by seawater at low tide Coastal lagoons Large shallow inlets and bays Reefs Salicornia and other annuals colonizing mud and sand Spartina swards

European site	Relevant Annex II marine mammal features	Distance to Scoping Boundary (km)	Additional offshore qualifying features
			Atlantic salt meadows Twaite shad Houting River lamprey Sea lamprey Brook lamprey Atlantic salmon Grey seal Otter Harbour seal
Store Rev SAC	Harbour porpoise	599.7	Harbour seal
Skagens Gren og Skagerak SAC	Harbour porpoise	643	Sandbanks which are slightly covered by sea water all the time Harbour seal
The Netherlands			
Doggersbank SAC	Harbour porpoise	258.2	Sandbanks which are slightly covered by sea water all the time Grey seal Harbour seal
Klaverbank	Harbour porpoise	320	Reefs Grey seal Harbour seal
Sweden			
Kosterfjorden-Väderöfjorden SAC	Harbour porpoise	720	Sandbanks which are slightly covered by sea water all the time Mudflats and sandflats not covered by seawater at low tide Large shallow inlets and bays Reefs Harbour seal

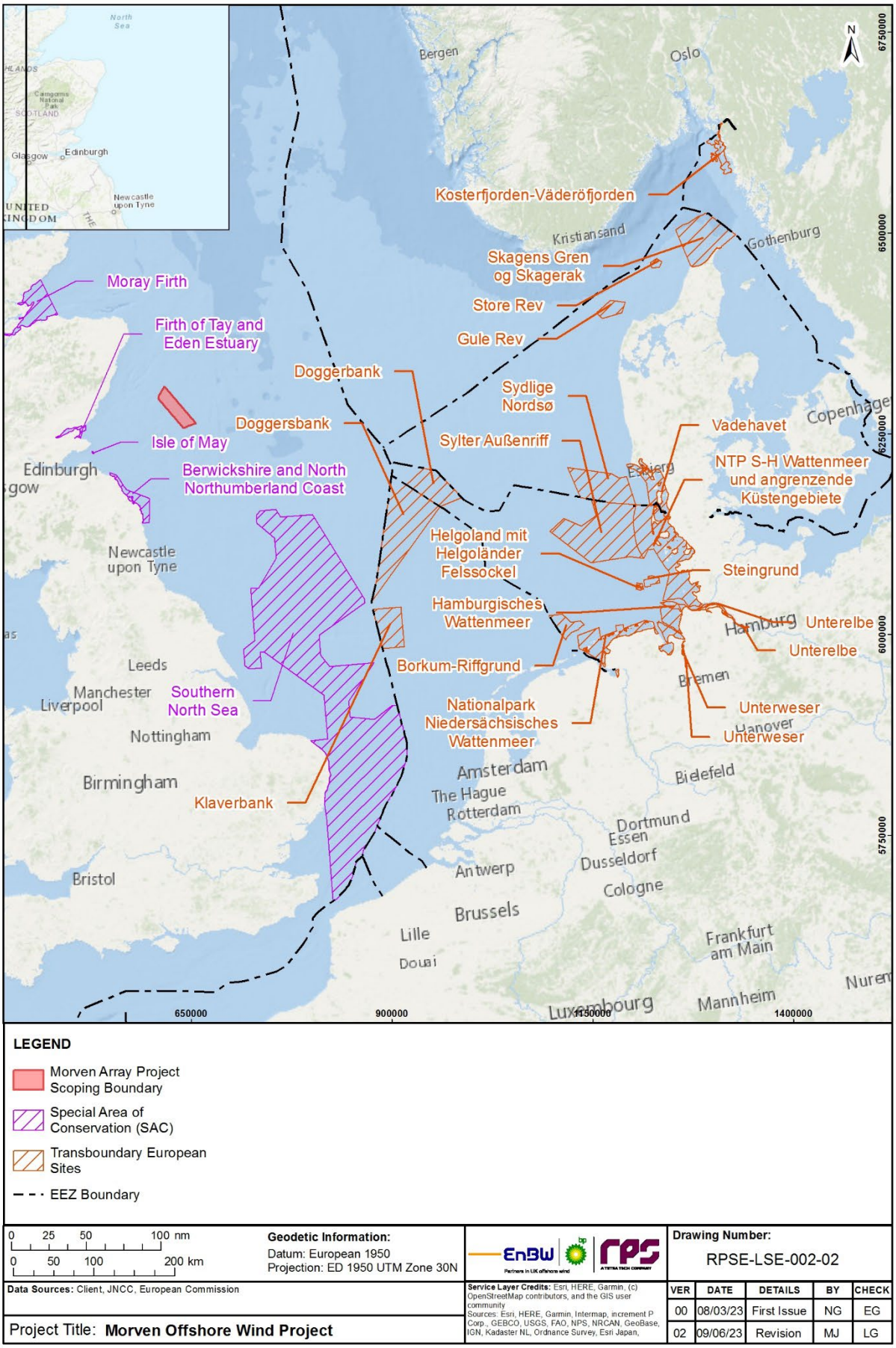

Figure 4.2: Location of the European sites with Annex II marine mammal features to be taken forward for the determination of LSE

4.5 European Sites Designated for Marine Ornithological Features

4.5.1 European Site Identification for Marine Ornithological Features

4.5.1.1 The following sections detail the results of the stepwise process to identify the European sites with relevant marine ornithological features to be taken forward for detailed determination of LSE, based on the methodology and criteria outlined in section 5 and Table 2.1.

4.5.1.2 This first stage identifies connectivity between designated site features[8] and the Array Project based on the distribution of each feature within relevant seasons. To inform the screening exercise presented for marine ornithological features the following bird categories have been defined:

- breeding seabirds in the breeding season (e.g. black-legged kittiwake at the Fowlsheugh SPA);
- breeding seabirds in the non-breeding season (e.g. black-legged kittiwake at the Fowlsheugh SPA outside of the breeding season);
- non-breeding seabirds (e.g. red-throated diver at the Firth of Forth SPA);
- migratory seabirds (little gull, tern species, petrel species, shearwater species, skua species);
- migratory waterbirds.

4.5.1.3 The impacts associated with the development of an OWF are identified in Table 4.3. The identification of connectivity uses the spatial extents of both the impact (the zone of influence) and distribution of birds. Table 4.3 identifies the spatial extents associated with each impact.

Table 4.3: Impacts associated with the Array Project

Impact	Zone of Influence of impact
Permanent habitat loss	Footprint of the Array Project only
Direct temporary habitat loss/disturbance	Footprint of the Array Project only
Indirect temporary habitat loss/ disturbance	Footprint of the Array Project plus 15km buffer associated with tidal extent
Collision	Footprint of the Array Project only
Displacement	Footprint of the Array Project and species-specific buffers based on JNCC et al. (2022)
Barrier effects	Footprint of the Array Project and species-specific buffers based on JNCC et al. (2022)
Accidental pollution	Footprint of the Array Project plus 15km buffer associated with tidal extent
Attraction to light	Footprint of the Array Project plus 15km buffer[9]

4.5.1.4 The spatial criteria used to identify connectivity for each bird category are:

- Breeding seabirds in the breeding season – the Foraging Ranges Screening Tool is applied for relevant breeding seabirds. This tool was developed by NIRAS for NatureScot and applies the recommended screening parameters (i.e., Woodward *et al.,* 2019, mean maximum foraging range plus 1 Standard Deviation (SD)) as recommended by NatureScot (2023a). It is understood

[8] References to SPAs throughout the report also include consideration of Ramsar Sites

[9] Based on the Conservation of Migratory Species (CMS) Guidelines (CMS, 2021) that incorporate the Australian National Light Pollution Guidelines for Wildlife, which assesses the impacts of Artificial Light At Night (ALAN) on marine turtles, seabirds and migratory shorebirds (Australian Government, 2020). Whilst the Guidelines summarize the available international laws and guidelines that address ALAN, focus is placed on terrestrial and specific seabird species. Comprehensive guidance for addressing the impacts and management of artificial light in the marine environment does not currently exist in literature or publications.

that this tool from NatureScot will be 'live' in 2023. The Foraging Ranges Screening Tool enables users to define or upload a shapefile of proposed development areas. The tool then identifies where the Scoping Boundary overlaps with a foraging range(s) and provides a list of sites and features with potential connectivity to the Array Project.

- Breeding birds in non-breeding seasons (biologically defined minimum population size (BDMPS)) – breeding birds from SPAs and Ramsar Sites in the non-breeding season are not constrained to specific areas due to the necessity to provision young, and typically disperse to exploit areas far beyond their breeding colonies. During the non-breeding season, therefore, the birds present within the Array Project may originate from sites that are further away than those considered in the breeding season. Furness (2015) considered how breeding seabirds disperse in the non-breeding season, defining the regions within which those populations would be distributed and for each region a BDMPS was calculated. Screening has applied those BDMPS regions and populations. Where the Array Project overlaps with a BDMPS region, potential connectivity is assumed with the population associated with that region (as defined by Furness, 2015) and the SPAs that contribute to that population.
- Non-breeding seabirds – SPA or Ramsar site boundary only (see Table 4.4 and the text below in relation to wintering guillemot and herring gull).
- Migrating seabirds (little gull, tern species, petrel species, shearwater species, skua species) and migratory waterbirds – migratory waterbirds and seabirds that breed in sites designated as SPA/ Ramsar in areas of the UK that are distant from the Array Project have some potential to interact with the Array Project during bi-annual migratory movements. Information has been obtained from relevant data sources to infer potential connectivity, namely; Wright *et al*., 2012, WWT and MacArthur Green (2014) and seabird tracking data (i.e. Buckingham *et al*., 2022).

4.5.1.5 The spatial criteria identified above have been informed by NatureScot guidance (NatureScot 2023a; 2023b). For certain features occurring in the non-breeding season, either as breeding seabirds in the non-breeding season or as discrete features that form SPAs designated specifically for non-breeding features, there are parts of the NatureScot (2023a) guidance that deviate from the approaches described above. These are identified in Table 4.4 alongside how these have been considered in this screening report.

Table 4.4: Screening approach for bird categories assessed

Screening category	Section in NatureScot (2023a)	Approach in this report
Wintering gull features of marine SPAs	5	The approach in NatureScot (2023a) has been followed with breeding foraging ranges (mean-maximum plus 1 SD) applied to all relevant SPAs.
Breeding seabird features of marine SPAs	6	The Screening Tool used for breeding seabirds in the breeding season applies the same foraging ranges to marine SPAs.
Breeding seabirds in the non-breeding season - guillemot	7	Breeding season foraging ranges (mean-max plus one standard deviation) (Woodward *et al.,* 2019) have been used to identify connectivity. This will identify connectivity with the same SPAs as identified using the foraging ranges for breeding birds in the breeding season. If an LSE is identified for an SPA in the breeding season then consideration will be given to impacts throughout the annual cycle in the RIAA.

4.5.1.6 In addition to the use of breeding season foraging range in the non-breeding season for guillemot, NatureScot and Marine Scotland Science have recently advised, as part of Scoping Opinions for other OWF projects, that this approach should also be applied for herring gull (NatureScot, 2021; Marine Scotland Science, 2021).

4.5.1.7 For migratory waterbird and seabird features, the process used to identify connectivity identifies connectivity with the species and at this stage does not identify specific SPAs. Identification of SPAs will be undertaken in section 5.1.4 once the process for determining LSE has been undertaken. This

approach is considered to encompass the approach advised by NatureScot (2023a) (section 4 in NatureScot 2023a), whilst also incorporating consideration of the connectivity between SPAs specific to migratory waterbird features.

4.5.2 Summary of European Sites Identified for Marine Ornithological Features

4.5.2.1 The initial screening process has identified 43 European sites with marine ornithological features to be taken forward for detailed determination of LSE in section 5 of this report. The European sites identified are listed in Table 4.5 and illustrated in Figure 4.3.

Table 4.5: European sites designated for marine ornithological features taken forward for the determination of LSE

European site / Species code	Relevant marine ornithological features	Distance to Array Project	Additional offshore qualifying features
Breeding birds in the breeding season			
Ailsa Craig SPA	• Gannet	293	• Lesser black-backed gull • Guillemot • Kittiwake • Herring gull
Auskerry SPA	• Storm petrel	251	• Arctic tern
Buchan Ness to Collieston Coast SPA	• Fulmar • Herring gull • Kittiwake • Common guillemot	68	• Shag
Calf of Eday SPA	• Fulmar • Kittiwake	273	• Cormorant • Great black-backed gull • Guillemot
Cape Wrath SPA	• Fulmar • Kittiwake	289	• Guillemot • Razorbill • Puffin
Copeland Islands SPA	• Manx shearwater	355	• Arctic tern
Copinsay SPA	• Fulmar • Kittiwake	237	• Guillemot • Great black-backed gull
Coquet Island SPA	• Fulmar • Lesser black-backed gull • Kittiwake • Puffin	132	• Roseate tern • Common tern • Arctic tern • Sandwich tern • Black-headed gull
East Caithness Cliffs SPA	• Fulmar • Kittiwake	199	• Peregrine • Guillemot • Razorbill • Herring gull • Great black-backed gull • Cormorant

European site / Species code	Relevant marine ornithological features	Distance to Array Project	Additional offshore qualifying features
			• Shag
Fair Isle SPA	• Fulmar • Gannet • Great skua • Kittiwake	289	• Fair Isle wren • Guillemot • Puffin • Razorbill • Arctic skua • Shag • Arctic tern
Farne Islands SPA	• Kittiwake • Guillemot • Puffin	103	• Arctic tern • Common tern • Roseate tern • Sandwich tern • Shag • Cormorant
Fetlar SPA	• Fulmar • Great skua	405	• Red-necked phalarope • Arctic tern • Whimbrel • Dunlin • Arctic skua
Flamborough & Filey Coast SPA	• Gannet • Kittiwake • Puffin • Fulmar	243	• Guillemot • Razorbill
Flannan Isles SPA	• Fulmar • Leach's petrel	411	• Guillemot • Razorbill • Puffin • Kittiwake
Forth Islands SPA	• Gannet • Lesser black-backed gull • Kittiwake • Guillemot • Razorbill • Puffin	101	• Arctic tern • Roseate tern • Common tern • Sandwich tern • Shag • Herring gull • Cormorant
Foula SPA	• Fulmar • Leach's petrel • Great skua	359	• Arctic tern • Red-throated diver • Guillemot • Puffin

European site / Species code	Relevant marine ornithological features	Distance to Array Project	Additional offshore qualifying features
			• Shag • Kittiwake • Razorbill • Arctic skua
Fowlsheugh SPA	• Fulmar • Herring gull • Kittiwake • Guillemot • Razorbill	59	• None
Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island SPA	• Manx shearwater	476	• Chough
Handa SPA	• Fulmar • Great skua • Kittiwake	291	• Guillemot • Razorbill
Hermaness, Saxa Vord and Valla Field SPA	• Fulmar • Gannet • Great skua	425	• Red-throated diver • Puffin • Shag • Guillemot • Kittiwake
Hoy SPA	• Fulmar • Great skua • Kittiwake • Puffin	243	• Red-throated diver • Peregrine • Arctic skua • Great black-backed gull • Guillemot
Isles of Scilly SPA	• Fulmar • Manx shearwater	808	• Storm petrel • Lesser black-backed gull • Great black-backed gull • Shag
Marwick Head SPA	• Kittiwake	277	• Guillemot
Mingulay and Berneray SPA	• Fulmar	388	• Razorbill • Shag • Kittiwake • Guillemot • Puffin
Mousa SPA	• Storm petrel	343	• None
North Caithness Cliffs SPA	• Fulmar • Kittiwake	218	• Peregrine • Guillemot

European site / Species code	Relevant marine ornithological features	Distance to Array Project	Additional offshore qualifying features
	• Puffin		• Razorbill
North Rona and Sula Sgeir SPA	• Fulmar • Leach's petrel • Gannet	369	• Gannet • Guillemot • Great black-backed gull • Kittiwake • Razorbill • Puffin
Northumberland Marine SPA	• Fulmar • Lesser black-backed gull • Herring gull • Kittiwake • Guillemot • Razorbill • Puffin	93	• Little tern • Roseate tern • Common tern • Arctic tern • Sandwich tern • Shag • Cormorant • Black-headed gull
Noss SPA	• Fulmar • Gannet • Great skua	357	• Guillemot • Kittiwake • Puffin
Ramna Stacks and Gruney SPA	• Leach's petrel	417	• None
Rathlin Island SPA	• Fulmar	348	• Razorbill • Peregrine • Kittiwake • Guillemot
Ronas Hill - North Roe and Tingon SPA	• Great skua	402	• Red-throated diver • Arctic skua • Lack guillemot • Whimbrel
Rousay SPA	• Fulmar • Kittiwake	274	• Arctic tern • Arctic skua • Guillemot
Skomer, Skokholm and the Seas off Pembrokeshire SPA	• Manx shearwater	597	• Short-eared owl • Puffin • Storm petrel • Lesser black-backed gull • Chough • Razorbill • Guillemot • Kittiwake

European site / Species code	Relevant marine ornithological features	Distance to Array Project	Additional offshore qualifying features
St Abb`s Head to Fast Castle SPA	• Kittiwake • Guillemot • Razorbill	103	• Herring gull • Shag
St Kilda SPA	• Fulmar • Manx shearwater • Leach's petrel • Gannet • Great skua	448	• Storm petrel • Puffin • Razorbill • Guillemot • Kittiwake
Sule Skerry and Sule Stack SPA	• Storm petrel • Leach's petrel • Gannet	307	• Puffin • Guillemot • Shag
Sumburgh Head SPA	• Fulmar	326	• Arctic tern • Guillemot • Kittiwake
The Shiant Isles SPA	• Fulmar	328	• Barnacle goose • Shag • Razorbill • Puffin • Guillemot • Kittiwake
Treshnish Isles SPA	• Storm petrel	317	• Greenland barnacle goose
Troup, Pennan and Lion`s Heads SPA	• Fulmar • Kittiwake • Guillemot • Razorbill	107	• Herring gull
West Westray SPA	• Fulmar • Kittiwake	285	• Arctic tern • Guillemot • Razorbill • Arctic skua
Breeding birds in the non-breeding season			
All SPAs identified for breeding seabirds in the breeding season	Guillemot	Not Applicable	Not Applicable
All SPAs identified for breeding seabirds in the breeding season	Herring gull	Not Applicable	Not Applicable
A009	Fulmar	Not Applicable	Not Applicable
A016	Gannet	Not Applicable	Not Applicable
A183	Lesser black-backed gull	Not Applicable	Not Applicable

European site / Species code	Relevant marine ornithological features	Distance to Array Project	Additional offshore qualifying features
A187	Great black-backed gull	Not Applicable	Not Applicable
A188	Kittiwake	Not Applicable	Not Applicable
A200	Razorbill	Not Applicable	Not Applicable
A204	Puffin	Not Applicable	Not Applicable
Non-breeding birds			
Outer Firth of Forth and St Andrews Complex SPA	• Herring gull	68	• Arctic tern • Black-headed gull • Common gull • Common scoter • Common tern • Eider • Gannet • Goldeneye • Guillemot • Kittiwake • Little gull • Long-tailed duck • Manx shearwater • Puffin • Razorbill • Red-reasted merganser • Red-throated diver • Shag • Slavonian grebe • Velvet scoter
Migratory waterbirds			
A674	Light-bellied brent goose	Not Applicable	Not Applicable
A045	Barnacle goose (Svalbard)	Not Applicable	Not Applicable
A039	Taiga bean goose	Not Applicable	Not Applicable
A040	Pink-footed goose	Not Applicable	Not Applicable
A038	Whooper swan	Not Applicable	Not Applicable
A048	Shelduck	Not Applicable	Not Applicable
A056	Shoveler	Not Applicable	Not Applicable
A051	Gadwall	Not Applicable	Not Applicable
A050	Wigeon	Not Applicable	Not Applicable
A053	Mallard	Not Applicable	Not Applicable
A054	Pintail	Not Applicable	Not Applicable
A052	Teal	Not Applicable	Not Applicable

European site / Species code	Relevant marine ornithological features	Distance to Array Project	Additional offshore qualifying features
A059	Pochard	Not Applicable	Not Applicable
A061	Tufted duck	Not Applicable	Not Applicable
A062	Scaup	Not Applicable	Not Applicable
A067	Goldeneye	Not Applicable	Not Applicable
A070	Goosander	Not Applicable	Not Applicable
A069	Red-breasted merganser	Not Applicable	Not Applicable
A122	Corncrake	Not Applicable	Not Applicable
A005	Great crested grebe	Not Applicable	Not Applicable
A007	Slavonian grebe	Not Applicable	Not Applicable
A130	Oystercatcher	Not Applicable	Not Applicable
A142	Lapwing	Not Applicable	Not Applicable
A140	Golden plover	Not Applicable	Not Applicable
A141	Grey plover	Not Applicable	Not Applicable
A137	Ringed plover	Not Applicable	Not Applicable
A158	Whimbrel	Not Applicable	Not Applicable
A160	Curlew	Not Applicable	Not Applicable
A157	Bar-tailed godwit	Not Applicable	Not Applicable
A616	Black-tailed godwit	Not Applicable	Not Applicable
A169	Turnstone	Not Applicable	Not Applicable
A143	Knot	Not Applicable	Not Applicable
A151	Ruff	Not Applicable	Not Applicable
A144	Sanderling	Not Applicable	Not Applicable
A672	Dunlin	Not Applicable	Not Applicable
A148	Purple sandpiper	Not Applicable	Not Applicable
A153	Snipe	Not Applicable	Not Applicable
A162	Redshank	Not Applicable	Not Applicable
A164	Greenshank	Not Applicable	Not Applicable
A082	Hen harrier	Not Applicable	Not Applicable
A222	Short-eared owl	Not Applicable	Not Applicable
A098	Merlin	Not Applicable	Not Applicable
Migratory seabirds			
None identified – no interaction between migratory corridors and Scoping Boundary			

Figure 4.3: Location of the European sites with marine ornithological features to be taken forward for the determination of LSE

5 Determination of Likely Significant Effect

5.1 Methodology

5.1.1.1 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 3.

5.1.1.2 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 Project on identified European 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.

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

- ✓ = LSE;
- × = No LSE;
- C = construction phase;
- O&M = O&M phase;
- D = decommissioning phase.

5.1.1.4 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."

5.1.1.5 NatureScot interprets the judgement to mean that it is those measures specifically intended to avoid or reduce harmful effects to a European site which cannot be considered at the LSE Screening stage 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 that may incidentally protect European sites to a degree, but which are intrinsic parts of the Array Project. For example, OWF typically require post-consent plans that 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 in relation to the Berwick Bank Offshore Windfarm[10], the Applicant has determined not to exclude such 'incidental' measures from the Array Project within this Stage 1 Screening Report.

5.1.2 Assessment of Likely Significant Effect for Annex II Diadromous Fish And Associated Features

5.1.2.1 The European sites identified in the initial screening process (section 4.3) to be taken forward for determination of LSE for Annex II diadromous fish features are outlined below in Table 5.1. The Natura 2000 Standard Data Forms for all European Sites are outlined in Appendix A.

[10] Scoping Opinion – Berwick Bank Offshore Wind Farm | Marine Scotland Information (2021)

Table 5.1: SACs and relevant qualifying features to be taken forward for determination of LSE for Annex II diadromous fish and freshwater pearl mussel

European site	Relevant Annex II diadromous fish features
River Tweed SAC	Atlantic salmon
River South Esk SAC	Atlantic salmon Freshwater pearl mussel
River Tay SAC	Atlantic salmon
River Spey	Atlantic salmon Freshwater pearl mussel
River Dee SAC	Atlantic salmon Freshwater pearl mussel
River Teith SAC	Atlantic salmon

Pathways for LSE: Potential Impacts on Annex II Diadromous Fish Features

5.1.2.2 This section provides a tabulated list of potential impacts and effects on Annex II diadromous fish that may result from activities associated with the Array Project (Table 5.2). These are the impacts which will be taken into account when determining the potential for LSE on the European sites and qualifying fish features identified in section 4.3.

5.1.2.3 The list of potential impacts has been compiled using the experience and knowledge gained from previous offshore wind farm projects in Scottish waters, the pressures data available on Scotland's environment web 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 chapter 8.2: Fish and Shellfish Ecology of the Scoping Report. Consideration of the potential impacts identified for Annex II diadromous fish and associated species is presented in the following sections to inform the determination of LSE in Table 5.3.

Table 5.2: Pathways for LSE: potential impacts on Annex II diadromous fish features

C = Construction phase, O = O&M phase, D = Decommissioning phase. 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 in green.

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes = ✓, No = ✗)
	C	O	D		
Temporary habitat loss and disturbance of habitats	✓	✓	✓	**All phases** There is potential for temporary, direct habitat loss and disturbance as a result of site preparation activities in advance of foundation installation activities, cable installation activities (including unexploded ordnance (UXO) clearance, pre-cabling seabed clearance and anchor placements), and placement of spud-can legs from jack-up operations. Temporary habitat loss / disturbance may occur during the O&M phase as a result of operations (e.g. cable repair/reburial, use of jack-up vessels to facilitate wind turbine component repairs, etc.). The impacts associated with these operations are likely to be similar in nature to those associated with the construction phase, although of reduced magnitude. There is potential for temporary, direct habitat loss and disturbance due to decommissioning activities to remove inter-array/interconnector cables resulting in potential effects on fish and shellfish ecology. This impact, however, is restricted to within the footprint of the Array Project and, as illustrated in Figure 4.1, there is no spatial overlap between the Array Project 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. There is potential for Annex II diadromous fish to be present in the waters in and around the Array Project and, therefore, to 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. **There is no spatial overlap between the Array Project and the SACs with Annex II diadromous fish features, therefore, this impact is screened out for all SACs. The impact is screened out.**	✗
Underwater sound impacting fish and shellfish receptors	✓	✗	✗	**Construction** There is potential for mortality, injury and/or disturbance to sensitive fish and shellfish species due to activities that generate underwater sound. Construction activities, including pile driving activities and UXO clearance, have the greatest potential for disturbance, auditory injury and/or mortality to diadromous fish species and there is potential for diadromous species to be present within or transiting through the Scoping Boundary and potential area of impact. The ZoI will be determined for the EIA through underwater sound modelling and,	✓

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes = ✓, No = ×)
	C	O	D		
				therefore, at this stage of the development process, the potential for LSE on any Annex II features of European sites as a result of underwater sound arising from construction activities cannot be excluded. **There is potential for LSE on Annex II diadromous fish features as a result of this impact during the construction phase of the Array Project. The impact is screened in.**	
Increased suspended sediment concentrations (SSCs) and associated sediment deposition	✓	✓	✓	**All phases** Sediment disturbance arising from construction activities (e.g. foundation and cable installation including drilling and any deposits arising, UXO clearance, and seabed preparation), maintenance operations (e.g. cable repair / reburial, etc.) and decommissioning activities (e.g. cable and foundation removal) may result in indirect impacts on fish and shellfish communities due to temporary increases in SSCs and associated sediment deposition (i.e. smothering effects). **All SACs are located well outside the ZoI for increases in SACs and associated sediment deposition (the closest is 63.5km from the Array Project). The impact is screened out.**	×
Long-term habitat loss	✓	✓	✓	**All phases** There is the potential for long term habitat loss to occur directly under all foundation structures and associated scour protection, and under any cable protection required. As foundations are installed throughout the construction phase this impact is also relevant to the construction phase, although this impact will largely occur throughout the O&M phase. Permanent habitat loss may occur under any infrastructure that is not decommissioned at the end of the Array Project's lifetime, such as cable or scour protection. **There is no spatial overlap between the Array Project and the SACs with Annex II diadromous fish features, therefore, this impact is screened out for all SACs. The impact is screened out.**	×
Colonisation of hard structures	×	✓	×	**O&M phase** Artificial structures placed on the seabed (i.e. foundations and scour/cable protection) in the offshore environment are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity. These structures may also facilitate the spread of marine INNS. **There is no spatial overlap between the Array Project and the SACs with Annex II diadromous fish features, therefore, this impact is screened out for all SACs. The impact is screened out.**	×
EMF from subsea electrical cabling	×	✓	×	**O&M phase** The presence of electrical inter-array/interconnector cables has the potential to emit a localised EMF that may interfere with the navigation of diadromous fish (Gill and Bartlett, 2010). Without further, more detailed, assessment, LSE on Annex II features of European sites as a result of EMF from subsea cabling cannot be ruled	✓

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes = ✓, No = ✗)
	C	O	D		
				out. The predator/prey relationship may be impacted by EMF generated through the subsea cables installed, which impacts the behaviours of fish and shellfish species behaviours with the changes to background EMFs. **LSE on Annex II diadromous fish features due to this impact across the O&M phase of the Array Project cannot be ruled out. The impact is screened in.**	

Determination of LSE For Annex II Diadromous Fish and Associated Features

5.1.2.4 Table 5.3 presents the results of the LSE determination assessment as a result of the Array Project on relevant qualifying interest features of the SACs identified in Table 5.1. These assessments are made in the absence of mitigation measures. The footnotes to the following tables provide a brief assessment to support the screening in or out of each of the LSE on the identified SAC features.

LSE in-combination

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

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

5.1.2.7 For Annex II diadromous fish, LSE alone is identified for the following impacts from the Array Project acting alone (see Table 5.3):

- underwater sound impacting fish and shellfish receptors;
- EMF from subsea electric cabling.

5.1.2.8 Therefore, the impacts outlined above will also be considered for the Array Project acting in-combination with other plans/projects at Appropriate Assessment.

Table 5.3: LSE matrix for SACs with Annex II fish and freshwater pearl mussel features

European site and relevant qualifying features	Temporary habitat loss/disturbance			Underwater sound impacting fish and shellfish receptors			Increased suspended sediment concentrations (SSCs) and associated sediment deposition			Long-term habitat loss			Colonisation of hard structures			EMF from subsea electrical cabling		
	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D	C	O	D
River Tweed SAC																		
Atlantic salmon	×	×	×	✓	×	×	×	×	×		×	×		×	×		✓	
River South Esk SAC																		
Atlantic salmon	×	×	×	✓	×	×	×	×	×		×	×		×	×		✓	
Freshwater pearl mussel	×	×	×	✓	×	×	×	×	×		×	×		×	×		✓	
River Tay SAC																		
Atlantic salmon	×	×	×	✓	×	×	×	×	×		×	×		×	×		✓	
River Spey																		
Atlantic salmon	×	×	×	✓	×	×	×	×	×		×	×		×	×		✓	
Freshwater pearl mussel	×	×	×	✓	×	×	×	×	×		×	×		×	×		✓	
River Dee SAC																		
Atlantic salmon	×	×	×	✓	×	×	×	×	×		×	×		×	×		✓	
Freshwater pearl mussel	×	×	×	✓	×	×	×	×	×		×	×		×	×		✓	
River Teith SAC																		
Atlantic salmon	×	×	×	✓	×	×	×	×	×		×	×		×	×		✓	

The text below explains the conclusion of whether LSE can be ruled out for a given impact. 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.

Temporary habitat loss/disturbance – As outlined in Table 5.2 this impact is screened out for all sites as there is no spatial overlap between the Array Project and any SACs with Annex II diadromous fish features. A finding of no LSE on the Annex II diadromous fish and freshwater pearl mussel features of all SACs from temporary habitat loss/disturbance during all phases is concluded.

Underwater sound impact fish and shellfish receptors - Construction activities, including pile driving activities and UXO clearance, have the greatest potential for disturbance, auditory injury and/or mortality to diadromous fish species. There is potential for migratory species to be present within, or transiting through, the Array Project and potential area of impact (injury and behavioural) from underwater sound during the construction phase. LSE on Annex II diadromous fish features of the site during the construction phase cannot be discounted. Sound levels will be substantially lower during the O&M phase and decommissioning phase. As such, a finding of no LSE has been reached with respect to Annex II diadromous fish qualifying interest features of the site during the O&M phase and the decommissioning phase.

Increases in SSC and sediment deposition – As outlined in Table 5.2, all SACs are located well outside the 20km ZoI for increases in SACs and associated sediment deposition (the closest is 63.5km from the Array Project -see Table 5.1). A finding of no LSE has been reached with respect to Annex II diadromous fish and freshwater pearl mussel features of all SACs from colonisation of hard structures during all phases.

Long term habitat loss - As outlined in Table 5.2 this impact is screened out for all sites as there is no spatial overlap between the Array Project and any SACs with Annex II diadromous fish features. A finding of no LSE has been reached with respect to the Annex II diadromous fish and freshwater pearl mussel features of all SACs from increases in SSC and sediment deposition during all phases.

Colonisation of hard structures - As outlined in Table 5.2 this impact is screened out for all sites as there is no spatial overlap between the Array Project and any SACs with Annex II diadromous fish features. A finding of no LSE has been reached with respect to the Annex II diadromous fish and freshwater pearl mussel features of all SACs from colonisation of hard structures during all phases.

EMF from subsea electrical cabling - There is potential for migratory species to be present within or transiting through the Array Project and the ZoI for EMF from subsea electrical cabling. LSE on the Annex II diadromous fish and freshwater pearl mussel features of all SACs with Annex II diadromous fish features from EMF during the O&M phase cannot be discounted.

5.1.3 Assessment of Likely Significant Effect for Annex II Marine Mammal Features

5.1.3.1 The European sites and relevant Annex II marine mammal features identified in the initial screening process (section 4.4) to be take forward for determination of LSE are outlined below in Table 5.4. The Natura 2000 Standard Data Forms for all European Sites are outlined in Appendix A.

Table 5.4: SACs and relevant qualifying features to be taken forward for determination of LSE for Annex II marine mammals

European site	Relevant Annex II marine mammal features
UK	
Berwickshire and North Northumberland Coast	Grey seal
Isle of May	Grey seal
Firth of Tay and Eden Estuary	Harbour seal
Southern North Sea	Harbour porpoise
Moray Firth	Bottlenose dolphin
Germany	
Doggerbank	Harbour porpoise
Sylter Außenriff	Harbour porpoise
Borkum-Riffgrund	Harbour porpoise
Östliche Deutsche Bucht	Harbour porpoise
Nationalpark Niedersächsisches Wattenmeer	Harbour porpoise
NTP S-H Wattenmeer und angrenzende Küstengebiete	Harbour porpoise
Helgoland mit Helgoländer Felssockel	Harbour porpoise
Steingrund	Harbour porpoise
Hamburgisches Wattenmeer	Harbour porpoise
Unterweser	Harbour porpoise
Unterelbe	Harbour porpoise
Denmark	
Sydlige Nordsø	Harbour porpoise
Gule Rev	Harbour porpoise
Vadehavet med Ribe Å, Tved Å og Varde Å vest for Varde	Harbour porpoise
Store Rev	Harbour porpoise
Skagens Gren og Skagerak	Harbour porpoise
The Netherlands	
Doggersbank	Harbour porpoise
Klaverbank	Harbour porpoise
Sweden	
Kosterfjorden-Väderöfjorden	Harbour porpoise

Pathways for LSE: Potential Impacts on Marine Mammal Features

5.1.3.2 This section provides a tabulated list of potential impacts and effects on Annex II marine mammals that may result from activities associated with the Array Project (Table 5.5). These are the impacts

that will be taken into account when determining LSE on the European sites and qualifying Annex II marine mammal features, identified in section 4.4.

5.1.3.3 The list of potential impacts has been compiled using the experience and knowledge gained from previous OWF projects in Scottish waters, the pressures data available on Scotland's environment web 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 chapter 8.3: Marine Mammals of the Scoping Report. Consideration of the potential impacts identified for Annex II marine mammal features is presented in the following sections to inform the determination of LSE in Table 5.6 and Table 5.7.

Table 5.5: Pathways for LSE: Potential Impacts on Annex II Marine Mammal Features

C = Construction phase, O = O&M phase, D = Decommissioning phase.

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes = ✓, No = ✗)
	C	O	D		
Injury and disturbance from underwater sound generated from piling.	✓	✗	✗	**Construction phase** Impact piling during construction may result in hearing damage/auditory injury or behavioural disturbance/displacement (including barrier effects) of marine mammals. The ZoI will be determined for the EIA through underwater sound modelling and, therefore, at this stage of the development process, LSE on any Annex II features of European sites as a result of underwater sound arising from construction activities cannot be excluded. **LSE on Annex II marine mammal features due to this impact across the construction phase of the Array Project cannot be discounted. The impact is screened in.**	✓
Injury and disturbance from underwater sound generation from unexploded ordnance (UXO) clearance.	✓	✗	✗	**Construction phase** UXO clearance may result in hearing damage/auditory injury or behavioural disturbance/displacement (including barrier effects) of marine mammals. The ZoI will be determined for the EIA through underwater sound modelling and, therefore, at this stage of the development process, LSE on any Annex II features of European sites as a result of underwater sound arising from construction activities cannot be excluded. **LSE on Annex II marine mammal features due to this impact across the construction phase of the Array Project cannot be discounted. The impact is screened in.**	✓
Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities.	✓	✓	✓	**All phases** The impact of vessel use during all phases of the Array Project may result in behavioural disturbance/displacement (including barrier effects) of marine mammals. Other (non-piling) related sound-producing activities could also result in disturbance including construction activities (e.g. drilling, trenching, and rock placement), O&M activities and decommissioning activities. **LSE on Annex II marine mammal features due to this impact across all phases of the Array Project cannot be discounted. The impact is screened in.**	✓
Injury to marine mammals due to collision with vessels.	✓	✓	✓	**All phases** Increased vessel traffic during construction activities, O&M activities and decommissioning activities may result in collisions with marine mammals. The extent of this potential disturbance will be spatially restricted to within the boundaries of the Array Project and along routes to local ports. Given the predicted low numbers of Annex II marine mammals within the Array Project and the increase in vessel traffic associated with the construction of the Array Project is likely to be low compared to background levels, the risk of a collision is very low.	✗

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes = ✓, No = ×)
	C	O	D		
				There is no potential for LSE on Annex II marine mammal features due to this impact across all phases of the Array Project. The impact is screened out.	
Effects on marine mammals due to changes in prey availability.	✓	✓	✓	**All phases** Changes in prey abundance and distribution resulting from construction activities, O&M activities and decommissioning activities may impact on the ability of marine mammals to forage in the area. Any potential temporary changes to the fish community in the vicinity of the Array Project will be largest during the construction phase, e.g. as a result of underwater sound impacts associated with piling, UXO clearance and pre-construction surveys. However, these are unlikely to result in adverse effects to Annex II marine mammal features given that the majority of impacts on prey species will be spatially limited to the Array Project (for habitat disturbance) and surrounding area (e.g. behavioural effects from underwater sound), particularly in the context of the extensive foraging ranges exhibited by marine mammals and their highly mobile nature. **There is no potential for LSE on Annex II marine mammal features due to this impact across all phases of the Array Project. The impact is screened out.**	×
Disturbance to marine mammals from pre-construction surveys.	✓	×	×	**Construction phase** Geophysical surveys during the construction phase may result in behavioural disturbance/ displacement of marine mammals. The ZoI will be determined for the EIA through underwater sound modelling and, therefore, at this stage of the development process, the potential for LSE on any Annex II features of European sites as a result of underwater sound arising from construction activities cannot be excluded. **LSE on Annex II marine mammal features due to this impact across the construction phase of the Array Project cannot be discounted. The impact is screened in.**	✓
Accidental pollution.	✓	✓	✓	**All phases** There is a risk of pollution being accidentally released during the construction, O&M and decommissioning phases from sources including vessels/vehicles and equipment/machinery. This may lead to direct mortality of marine mammals or a reduction in prey availability, either of which may affect species' survival rates. Pollution events are, however, considered unlikely Should an event occur, effects will be temporary, reversible and limited in spatial extent. The Array Project will also follow best practice guidance implemented by OSPAR, MARPOL and IMO. **There is no potential for LSE on Annex II marine mammal features due to this impact across all phases of the Array Project. The impact is screened out.**	×

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes = ✓, No = ×)
	C	O	D		
Increased SSC and associated sediment deposition.	✓	✓	✓	**All phases** Disturbance to water quality as a result of construction operations can have both direct and indirect impacts on marine mammals. Marine mammals are well known to forage in tidal areas where water conditions are turbid and visibility conditions poor. For example, harbour porpoise and harbour seal in the UK have been documented foraging in areas with high tidal flows (e.g., Pierpoint, 2008; Marubini *et al.*, 2009; Hastie *et al.*, 2016); therefore, low light levels, turbid waters and suspended sediments are unlikely to negatively impact marine mammal foraging success. When the visual sensory systems of marine mammals are compromised, they are able to sense the environment in other ways; for example, seals can detect water movements and hydrodynamic trails with their mystacial vibrissae, while odontocetes primarily use echolocation to navigate and find food in darkness. Elevated levels of SSC arising during all phases of the Array Project are expected to be localised with sediments rapidly dissipating over one tidal excursion. In addition, marine mammals present here will be tolerant of any small scale increases, such as those associated with the Array Project activities resulting from the large natural variability in the SSC within the North Sea. **There is no potential for LSE on Annex II marine mammal features due to this impact across all phases of the Array Project. The impact is screened out.**	×
Impact of EMF (from surface lain or buried cables).	×	✓	×	**O&M phase** Based on the data available to date, there is no evidence of EMF related to marine renewable devices having any impact (either positive or negative) on marine mammals (Copping, 2018). There is no evidence that seals can detect or respond to EMF, however, some species of cetaceans may be able to detect variations in magnetic fields (Normandeau *et al.*, 2011). To date, the only marine mammal known to show any response to EMF is the Guiana dolphin (*Sotalia guianensis*), which has been shown to possess an electroreceptive system that uses the vibrissal crypts on their rostrum to detect electrical stimuli similar to those generated by small to medium sized fish (Czech-Damal *et al.,* 2013). However, this has not been shown in any other species of marine mammal and this species does not occur within the Morven marine mammal study area for the generation assets. **There is no potential for LSE on Annex II marine mammal features due to this impact across all phases of the Array Project. The impact is screened out.**	×
Disturbance to marine mammals from operational sound from wind turbine operation.	×	✓	×	**O&M phase** The Marine Management Organisation (MMO, 2014) review of post-consent monitoring at OWF found that, in general, available data on the operational wind turbine sound from the UK and abroad showed that sound levels from operational wind turbines are low and the spatial extent of the potential impact of the operational wind turbine sound on marine receptors is generally estimated to be small, with behavioural response only likely at ranges close to the wind turbines. This	×

Impact	Relevant project phase			Justification for screening decision	Potential for an LSE to occur (Yes = ✓, No = ✗)
	C	O	D		
				is supported by several published studies, which provide evidence that marine mammals are not displaced from operational wind farms. At the Horns Rev and Nysted offshore wind farms in Denmark, long term monitoring showed that both harbour porpoise and harbour seal were sighted regularly within the operational OWF and, within two years of operation, the populations had returned to levels that were comparable with the wider area (Diederichs *et al.*, 2008). Similarly, a monitoring programme at the Egmond aan Zee OWF in the Netherlands reported that significantly more porpoise activity was recorded within the OWF compared to the reference area during the operational phase (Scheidat *et al.*, 2011). Other studies at Dutch and Danish offshore wind farms (Lindeboom *et al.*, 2011) also suggest that harbour porpoise may be attracted to increased foraging opportunities within operating OWFs. In addition, tagging work by Russell *et al.* (2014) found that some tagged harbour and grey seals demonstrated grid like movement patterns as these animals moved between individual wind turbines, strongly suggestive of these structures being used for foraging. Other reviews have also concluded that operational wind farm sound will have negligible effects (Madsen *et al.*, 2006; Teilmann *et al.*, 2006a; Teilmann *et al.*, 2006b; Cefas, 2010; Brasseur *et al.*, 2012). **There is no potential for LSE on Annex II marine mammal features due to this impact across all phases of the Array Project. The impact is screened out.**	

Determination of LSE for Marine Mammal Features

5.1.3.4 Table 5.6 and Table 5.7 present the results of the LSE determination assessment as a result of the Array Project on relevant Annex II marine mammal qualifying features of the SACs, identified in Table 5.1. These assessments are made in the absence of mitigation measures. The footnotes to the following tables provide a brief assessment to support the screening in or out of each of the LSEs in relation to the relevant Annex II marine mammal features.

LSE in-Combination

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

5.1.3.6 Given the highly precautionary method for site selection used in this HRA Stage 1 Screening Report, it is considered that the consolidation of other plans and projects would not likely result in additional European sites or new effect pathways being identified for the screening of LSE.

5.1.3.7 For Annex II marine mammals, LSE alone is identified for the following impacts from the Array Project acting alone (see Table 5.6):

- injury and disturbance from underwater sound generated from piling;
- injury and disturbance from underwater sound generation from UXO clearance;
- disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities;
- disturbance to marine mammals from pre-construction surveys.

5.1.3.8 Therefore, the impacts outlined above will also be considered for the Array Project acting in-combination with other plans/projects at Appropriate Assessment.

Table 5.6: LSE matrix for SACs in UK waters with Annex II marine mammal features

C = Construction phase, O = O&M phase, D = Decommissioning phase.

European site and relevant qualifying features	Injury and disturbance from underwater sound generated from piling			Injury and disturbance from underwater sound generation from UXO clearance			Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities			Injury to marine mammals due to collision with vessels			Effects on marine mammals due to changes in prey availability			Disturbance to marine mammals from pre-construction surveys			Accidental pollution			Increased SSC and associated sediment deposition			Impact of EMF (from surface lain or buried cables)			Disturbance to marine mammals from operational sound from wind turbine operation		
	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	✓			✓			✓	✓	✓	×	×	×	×	×	×	✓			×	×	×	×	×	×	×	×	×	×	×	×
Firth of Tay and Eden Estuary SAC																														
Harbour seal	✓			✓			✓	✓	✓	×	×	×	×	×	×	✓			×	×	×	×	×	×	×	×	×	×	×	×
Isle of May SAC																														
Grey seal	✓			✓			✓	✓	✓	×	×	×	×	×	×	✓			×	×	×	×	×	×	×	×	×	×	×	×
Southern North Sea SAC																														
Harbour porpoise	✓			✓			✓	✓	✓	×	×	×	×	×	×	✓			×	×	×	×	×	×	×	×	×	×	×	×
Moray Firth SAC																														
Bottlenose dolphin	✓			✓			✓	✓	✓	×	×	×	×	×	×	✓			×	×	×	×	×	×	×	×	×	×	×	×

The text below explains the conclusion of whether LSE can be ruled out for a given impact. 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.

Injury and disturbance from underwater sound generated from piling - as discussed in Table 5.6, there is potential for all features of the SACs listed above to occur within the ZoI (for both injury and behavioural disturbance) from elevated underwater sound associated with piling during the construction phase. Overall, it is concluded that LSE cannot be discounted for all features of their respective SACs due to this impact during the construction phase.

Injury and disturbance from underwater sound generation from UXO clearance - as discussed in Table 5.6, there is potential for all features of the SACs listed above to occur within the ZoI (for both injury and behavioural disturbance) from elevated underwater sound associated with UXO clearance during the construction phase. Overall, it is concluded that LSE cannot be discounted for all features of their respective SACs due to this impact during the construction phase.

Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities - as discussed in Table 5.6, there is potential for all features of the SACs listed above to occur within the ZoI for behavioural disturbance from vessel use and other (non-piling) sound-producing activities during all phases. Overall, it is concluded that LSE cannot be discounted for all features of their respective SACs due to this impact during all phases.

Injury to marine mammals due to collision with vessels - as discussed in Table 5.6, the increase in vessel traffic and activity associated with all phases of the Array Project would be low in comparison to baseline levels. The likelihood of this impact occurring is low and considering the distance to the SACs considered (the closest site being the Firth of Tay and Eden Estuary SAC, which is 95.9km away), there is considered to be little potential of increased vessel traffic and activity resulting in an adverse impact to Annex II marine mammals in terms of collision risk. Overall, it is concluded there are no LSE on Annex II marine mammal features of any European site due to this impact across all phases of the Array Project.

Effects on marine mammals due to changes in prey availability - as discussed in Table 5.6, changes in prey availability are unlikely to result in adverse effects on Annex II marine mammal features given that the majority of impacts on prey species will be spatially limited to the Array Project (for habitat disturbance) and surrounding area (e.g. behavioural effects from underwater sound), particularly in the context of the extensive foraging ranges exhibited by marine mammals and their highly mobile nature. Overall, it is concluded there are no LSE on Annex II marine mammal features of any European site due to this impact across all phases of the Array Project.

Disturbance to marine mammals from pre-construction surveys - as discussed in Table 5.6, there is potential for all features of the SACs listed above to occur within the ZoI (for both injury and behavioural disturbance) from elevated underwater sound associated with pre-construction surveys during the construction phase. Overall, it is concluded that LSE cannot be discounted for all features of their respective SACs due to this impact during the construction phase.

Accidental pollution - as discussed in Table 5.6, pollution events are considered unlikely and, should an event occur, effects will be temporary, reversible and limited in spatial extent. Overall, it is concluded that there are no LSE on Annex II marine mammal features of any European site due to this impact across all phases of the Array Project.

Increased SSC and associated sediment deposition - as discussed in Table 5.6, elevated levels of SSC arising during all phases of the Array Project are expected to be localised with sediments rapidly dissipating over one tidal excursion. In addition, marine mammals present here will be tolerant of any small-scale increases, such as those associated with the Array Project activities resulting from the large natural variability in the SSC within the North Sea. Overall, it is concluded there are no LSE on Annex II marine mammal features of any European site due to this impact across all phases of the Array Project.

Impact of EMF (from surface lain or buried cables) – based on the evidence provided in Table 5.6, it is concluded there are no LSE on Annex II marine mammal features of any European site due to this impact across the O&M phase of the Array Project.

Disturbance to marine mammals from operational sound from wind turbine operation - based on the evidence provided in Table 5.6, it is concluded there are no LSE on Annex II marine mammal features of any European site due to this impact across the O&M phase of the Array Project.

Table 5.7: LSE matrix 19 transboundary European sites with Annex II marine mammal features

C = Construction phase, O = O&M phase, D = Decommissioning phase.

European site and relevant qualifying features	Injury and disturbance from underwater sound generated from piling			Injury and disturbance from underwater sound generation from UXO clearance			Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities			Injury to marine mammals due to collision with vessels			Effects on marine mammals due to changes in prey availability			Disturbance to marine mammals from pre-construction surveys			Accidental pollution			Increased SSC and associated sediment deposition			Impact of EMF (from surface lain or buried cables)			Disturbance to marine mammals from operational sound from wind turbine operation		
	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
All transboundary European sites listed in Table 5.4.																														
Harbour porpoise	×			×			×	×	×	×	×	×	×	×	×	×			×	×	×	×	×	×	×	×	×	×	×	×

The text below explains the conclusion of whether LSE can be ruled out for a given impact. Within the table where an 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.

Injury and disturbance from underwater sound generated from piling - the nearest transboundary European site, Doggersbank SCI, is located 258.2km from the Array Project. Given the significant distance between this European site and the Array Project, the Scoping Boundary is unlikely to constitute important foraging grounds for harbour porpoise features of this site and the other European sites that are located at a greater distance. Therefore, the likelihood of harbour porpoise to occur within the ZoI (for both injury and behavioural disturbance) from elevated underwater sound associated with piling is very low. Overall, a conclusion of no LSE has been reached for the harbour porpoise features of any transboundary site due to injury and disturbance from underwater sound generated from piling during the construction phase.

Injury and disturbance from underwater sound generation from UXO clearance - the nearest transboundary European site, Doggersbank SCI, is located 258.2km from the Array Project, given the significant distance between this European site and the Scoping Boundary, the Array Project is unlikely to constitute important foraging grounds for the harbour porpoise features of this site and the other European sites that are located at a greater distance. Therefore, the likelihood of harbour porpoise to occur within the ZoI (for both injury and behavioural disturbance) from elevated underwater sound associated with UXO clearance is very low. Overall, a conclusion of no LSE has been reached with respect to the harbour porpoise features of any transboundary site due to injury and disturbance from underwater sound generated from UXO clearance during the construction phase.

Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities - as discussed in Table 5.6, the increase in underwater sound from vessel traffic will be small in comparison to existing background levels and activities within the Array Project. Activities such as drilling, trenching and rock placement will also be intermittent and short term. Given the significant distance between the Array Project and the nearest transboundary European site (Doggersbank SCI, 258.2km), a conclusion of

LSE has been reached for Annex II marine mammal features that might result from disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities across all phases of the Array Project.

Injury to marine mammals due to collision with vessels - as discussed in Table 5.6, the increase in vessel traffic across all phases of the Array Project is considered to be low compared to baseline levels. Furthermore, the likelihood of collisions between marine mammals and vessels is considered to be low as the nearest transboundary European site, Doggersbank SCI, is located 258.2km from the Array Project. Overall, a conclusion of no LSE has been reached with respect to the harbour porpoise features of any transboundary European site from collision risk with vessels for all phases of the Array Project.

Effects on marine mammals due to changes in prey availability - changes in prey availability are unlikely to result in adverse effects on Annex II marine mammal features given that the majority of impacts on prey species will be spatially limited to the Array Project (for habitat disturbance) and surrounding area (e.g. behavioural effects from underwater sound). In the context of the extensive foraging ranges exhibited by marine mammals and their highly mobile nature, effects on marine mammals due to changes in prey availability are considered particularly unlikely. Given this, and the significant distance between the Array Project and the nearest transboundary European site (Doggersbank SCI, 258.2km), a conclusion of no LSE has been reached with respect to Annex II marine mammal features due to changes in prey availability across all phases of the Array Project.

Disturbance to marine mammals from pre-construction surveys – the nearest transboundary European site, Doggersbank SCI, is located 258.2km from the Array Project. Given the significant distance between this European site and the Array Project, the Scoping Boundary is unlikely to constitute important foraging grounds for harbour porpoise features of this site and the other European sites that are located at a greater distance. Therefore, the likelihood of harbour porpoise to occur within the ZoI (for both injury and behavioural disturbance) from elevated underwater sound associated with pre-construction surveys is very low. Overall, a conclusion of no LSE has been reached with respect to the harbour porpoise features of any transboundary site due to injury and disturbance from underwater sound generated from pre-construction surveys during the construction phase.

Accidental pollution - as discussed in Table 5.6, pollution events are considered unlikely and, should an event occur, effects will be temporary, reversible and limited in spatial extent. Overall, no LSE is concluded with respect to the harbour porpoise features of any transboundary site from accidental pollution across all phases.

Increased SSC and associated sediment deposition – the nearest transboundary European site, Doggersbank SCI, is located 258.2km from the Array Project. Given the significant distance between this European site and the Array Project and that elevated levels of SSC arising during all phases of the Array Project are expected to be localised with sediments rapidly dissipating over one tidal excursion. Overall, a conclusion of no LSE has been reached with respect to the harbour porpoise features of any transboundary European site from increased SSC and associated sediment deposition.

Impact of EMF (from surface lain or buried cables) – based on the evidence provided in Table 5.6 the significant distance between the Array Project and the nearest transboundary European site (Doggersbank SCI is located 258.2km), a conclusion of no LSE has been reached with respect to Annex II marine mammal features of any transboundary European site due to EMF across the O&M phase of the Array Project.

Disturbance to marine mammals from operational sound from wind turbine operation - based on the evidence provided in Table 5.6 the significant distance between the Array Project and the nearest transboundary European site (Doggersbank SCI is located 258.2km from the Array Project), a conclusion of no LSE has been reached with respect to Annex II marine mammal features of any transboundary European site due to operational sound from wind turbines across the O&M phase of the Array Project.

5.1.4 Assessment of Likely Significant Effects for marine ornithological features

5.1.4.1 The European sites identified in the initial screening process (section 4.5) to be taken forward for determination of LSE for marine ornithological features are outlined below in Table 5.9. The Natura 2000 Standard Data Forms for all European Sites are outlined in Appendix A.

Table 5.8: SPAs and relevant qualifying features to be taken forward for determination of LSE for marine ornithological features

European site/Ramsar	Relevant marine ornithological features
Ailsa Craig SPA	• Gannet
Auskerry SPA	• Storm petrel
Buchan Ness to Collieston Coast SPA	• Fulmar • Herring gull • Kittiwake • Guillemot
Calf of Eday SPA	• Fulmar • Kittiwake
Cape Wrath SPA	• Fulmar • Kittiwake
Copeland Islands SPA	• Manx shearwater
Copinsay SPA	• Fulmar • Kittiwake
Coquet Island SPA	• Fulmar • Lesser black-backed gull • Kittiwake • Puffin
East Caithness Cliffs SPA	• Fulmar • Kittiwake
Fair Isle SPA	• Fulmar • Gannet • Great skua • Kittiwake
Farne Islands SPA	• Kittiwake • Guillemot • Puffin
Fetlar SPA	• Fulmar • Great skua
Flamborough & Filey Coast SPA	• Gannet • Kittiwake • Puffin
Flannan Isles SPA	• Fulmar • Leach's petrel
Forth Islands SPA	• Gannet • Lesser black-backed gull • Kittiwake • Guillemot

European site/Ramsar	Relevant marine ornithological features
	• Razorbill • Puffin
Foula SPA	• Fulmar • Leach's petrel • Great skua
Fowlsheugh SPA	• Fulmar • Herring gull • Kittiwake • Guillemot • Razorbill
Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island SPA	• Manx shearwater
Handa SPA	• Fulmar • Great skua • Kittiwake
Hermaness, Saxa Vord and Valla Field SPA	• Fulmar • Gannet • Great skua
Hoy SPA	• Fulmar • Great skua • Kittiwake • Puffin
Isles of Scilly SPA	• Fulmar • Manx shearwater
Marwick Head SPA	• Kittiwake
Mingulay and Berneray SPA	• Fulmar
Mousa SPA	• Storm petrel
North Caithness Cliffs SPA	• Fulmar • Kittiwake • Puffin
North Rona and Sula Sgeir SPA	• Fulmar • Leach's petrel • Gannet
Northumberland Marine SPA	• Fulmar • Lesser black-backed gull • Herring gull • Kittiwake • Guillemot • Razorbill • Puffin
Noss SPA	• Fulmar • Gannet • Great skua
Outer Firth of Forth and St Andrews Bay Complex SPA	• Herring gull

European site/Ramsar	Relevant marine ornithological features
Ramna Stacks and Gruney SPA	• Leach's petrel
Rathlin Island SPA	• Fulmar
Ronas Hill - North Roe and Tingon SPA	• Great skua
Rousay SPA	• Fulmar • Kittiwake
Skomer, Skokholm and the Seas off Pembrokeshire SPA	• Manx shearwater
St Abb`s Head to Fast Castle SPA	• Kittiwake • Guillemot • Razorbill
St Kilda SPA	• Fulmar • Manx shearwater • Leach's petrel • Gannet • Great skua
Sule Skerry and Sule Stack SPA	• Storm petrel • Leach's petrel • Gannet
Sumburgh Head	• Fulmar
The Shiant Isles SPA	• Fulmar
Treshnish Isles SPA	• Storm petrel
Troup, Pennan and Lion`s Heads SPA	• Fulmar • Kittiwake • Guillemot • Razorbill
West Westray SPA	• Fulmar • Kittiwake

Pathways for LSE: potential impacts on marine ornithological features

5.1.4.2 This section provides a list of potential impacts and effects on marine ornithological features that may result from activities associated with the Array Project. These are the impacts that must be taken into account when determining LSE on the European sites and qualifying features identified in section 4.5.

5.1.4.3 The list of potential impacts has been compiled using the experience and knowledge gained from previous OWF projects in Scottish waters, the pressures data available on Scotland's environment web for individual features of sites, NatureScot's guidance for plan-making bodies in Scotland (NatureScot, 2015), JNCC's pressures-activities database (Robson *et al.,* 2018), Natural England's advice on operations (such as Natural England, 2022) and Marine Directorate's Sectoral Marine Plan (Marine Scotland, 2019). The list of potential impacts has also been informed by chapter 8.4: Offshore Ornithology of the Scoping Report. Consideration of the potential impacts identified for marine ornithological features is presented in the following sections to inform the determination of LSE.

Table 5.9: Pathways for LSE: potential impacts on marine ornithological features

C = Construction phase, O = O&M phase, D = Decommissioning phase.

Impact	Relevant project phase			Basis for screening decision	Potential for an LSE to occur (Yes = ✓, No = ✗)
	C	O	D		
Permanent habitat loss	✓	✓	✗	Area affected by permanent habitat loss due to the presence of Array Project components on the seabed is considered to be negligible when compared to the foraging areas that bird species that may interact with the Array Project might utilise.	✗
Direct temporary habitat loss/disturbance	✓	✓	✓	The impact of construction/decommissioning activities and activities associated with the maintenance of operational wind turbines (such as increased vessel activity and underwater sound) may result in direct disturbance of birds from important feeding and roosting areas. Impact could occur within the Scoping Boundary and an associated buffer and between the Scoping Boundary and relevant points along the coastline (based on worst assumptions for vessels associated with the Array Project and could occur throughout the lifetime of Array Project.	✓
Indirect temporary habitat loss/ disturbance	✓	✓	✓	The impact of construction activities such as increased vessel activity and underwater/above water sound may result in disturbance or displacement of prey from important bird feeding areas. In addition, changes in hydrological energy, wave exposure, suspension of sediments, etc. arising from the physical presence of structures in the marine environment or the activities associated with installing such structures in the marine environment may also displace prey. Impact could occur within the Scoping Boundary and an associated 15km buffer (based on tidal extent) and between the Scoping Boundary and relevant points along the coastline based on worst case assumptions for vessels associated with the Array Project. Impact could occur throughout the lifetime of the Array Project.	✓
Collision	✗	✓	✗	Mortality arising from birds colliding with wind turbine structures. Impact is restricted to the Scoping Boundary and will occur in the O&M phase of the Array Project.	✓
Displacement	✗	✓	✗	The impact of physical displacement from an area due to the physical presence of wind turbines and other ancillary structures during the O&M phase of the development may result in effective habitat loss and reduction in species survival rates and fitness. Impact could occur within the Scoping Boundary and an associated buffer during the O&M phase.	✓
Barrier effects	✗	✓	✗	The impact of barrier effects caused by the physical presence of wind turbines and ancillary structures may prevent clear transit of birds between foraging and breeding sites and whilst on migration. Additional energetic costs incurred may reduce fitness and survival rate of a species.	✓
Accidental pollution	✓	✓	✓	Pollution events are considered unlikely. Should an event occur, effects will be temporary, reversible and limited in spatial extent. The Array Project will also follow best practice guidance implemented by OSPAR, MARPOL and IMO. As part of recent Scoping Opinions for projects in Scottish waters, the Scottish Ministers have agreed that this impact should be scoped out (see for example Marine Scotland, 2022).	✗
Attraction to light	✗	✓	✗	The impact of attraction to lit structures by migrating birds in particular may cause disorientation, reduction in fitness and possible mortality.	✓

Determination of LSE for Marine Ornithological Features

5.1.4.4 Table 5.16 presents the results of the LSE determination assessment as a result of the Array Project on relevant qualifying interest features of the SPAs identified in Table 5.8. Consideration is given in Table 5.16 to various factors to determine LSE all features for which connectivity has been identified. These include:

- the vulnerability of each species to impacts associated with the Array Project;
- the limitations of the Screening Tool as applied in the breeding season, including the application of foraging ranges to SPAs designated to protect foraging areas and the application of foraging ranges over land;
- the abundance of species at the Array Project as recorded during baseline aerial surveys;
- site specific foraging range data.

5.1.4.5 Further detail on each of these factors is provided in the footnotes below in Table 5.16. These assessments are made in the absence of mitigation measures. The footnotes to the following tables provide a brief assessment to support the screening in or out the LSE on the identified qualifying features.

5.1.4.6 In addition, consideration of factors specific to breeding birds in the non-breeding season and migratory waterbirds is provided in the following sections.

Breeding seabirds in the non-breeding season

5.1.4.7 Connectivity has been identified for breeding seabirds in the non-breeding season using the areas associated with the BDMPS for each species. To determine LSE, two factors are considered in this section:

- the abundance of each species as recorded during baseline aerial surveys;
- the contribution of each SPA to the total BDMPS population.

5.1.4.8 As part of this screening exercise, where an LSE is identified for a breeding seabird in the breeding season, impacts will be considered throughout the annual cycle regardless of the conclusions reached in this section.

5.1.4.9 Population estimates from the baseline digital aerial survey campaign are currently available from January 2021 to March 2022, therefore, incorporating at least one full non-breeding season for all species based on the seasons in NatureScot (2020). The abundance of each species during those months forming the non-breeding season relevant to that species is presented in Table 5.10.

Table 5.10: Occurrence and abundance of seabirds at the Array Project during the site specific non-breeding seasons

Species	Monthly occurrence	Abundance
Fulmar	Recorded in all non-breeding season months	Peak of 185 birds in November 2021 and at least 10 birds recorded in each month
Gannet	Recorded in all months except January 2021	Peak of 101 birds in October 2021 with fewer than 15 birds in all other months
Lesser black-backed gull	Not recorded during non-breeding season months	
Great black-backed gull	Recorded in seven months	Peak of 9 birds in November 2021 with a total of 19 birds across other all months
Kittiwake	Recorded in all non-breeding season months	Peak of 151 birds recorded in March 2021 and at least 10 birds in all other months except December 2021 and January 2022
Razorbill	Recorded in all non-breeding season months except December 2021 (although many birds identified only to	Peak of 77 birds in September 2021 with fewer than 20 birds in all other months except January 2021 and February 2021

Species	Monthly occurrence	Abundance
	guillemot/razorbill were recorded in December 2021)	(considerable numbers of unidentified guillemot/razorbill also present in all months)
Puffin	Recorded in six months	Peak of 290 birds in September 2021 with fewer than 10 birds in all other months except March 2021

5.1.4.10 On the basis of low abundance within the baseline aerial survey area, no LSE is concluded for lesser black-backed gull with respect to any SPAs for which connectivity was identified in the non-breeding season only.

5.1.4.11 The remaining species of relevance are fulmar, gannet, great black-backed gull, kittiwake, razorbill and puffin with these species having been recorded in greater abundance during the baseline aerial surveys, in most cases, throughout the species-specific non-breeding seasons.

5.1.4.12 Outside of the breeding season, breeding seabirds are not constrained by the necessity to provision young and can, therefore, utilise areas a greater distance from the breeding colony than during the breeding season. Furness (2015) considered how breeding seabirds disperse in the non-breeding season, defining the regions within which those populations would be distributed and for each region a population was calculated with these areas and associated population termed BDMPS. It is generally assumed that birds are evenly mixed throughout the BDMPS areas meaning that when these spatial areas are used to identify connectivity, connectivity is identified between the Array Project and all SPAs at which the species is a qualifying feature in the UK.

5.1.4.13 For the majority of species included in Furness (2015), two BDMPS are defined. These are often split to encompass the North Sea and UK western waters with the English Channel contained within one or the other. For the species considered within the breeding seabirds in the non-breeding season, the BDMPS of interest is the UK North Sea waters or the UK North Sea and Channel. The area affected by the Array Project would represent a negligible proportion of the area available to seabirds in the non-breeding season with many species migrating to areas outside of the North Sea. In addition, the seasonal populations of birds that may utilise the Array Project during the non-breeding season are composed of birds from multiple colonies, reducing the impact on any one single colony. The potential for LSE is considered for fulmar, gannet, great black-backed gull, kittiwake, razorbill and puffin, taking into account the contribution of each SPA at which these species are qualifying features to the relevant total BDMPS population for the UK North Sea or UK North Sea and Channel (from Furness, 2015). This is illustrated in Table 5.11 where the contribution of individual colonies to the total BDMPS populations presented in Furness (2015) is calculated.

5.1.4.14 The calculations presented in Table 5.11 indicate that many of the SPA populations represent a small proportion of the overall BDMPS population that could interact with the Array project. Based on the general assumptions that birds within the BDMPS are evenly distributed and mixed, it is considered that there will be no LSE on those SPA populations for which the contribution calculated in Table 5.11 is less than 1% (with the caveat that where LSE is identified in the breeding season then impacts will be considered throughout the annual cycle). Consideration of the factors mentioned above that may preclude LSE for those SPAs where the contribution to the BDMPS is more than 1% (highlighted in green) is provided in Table 5.16.

Table 5.11: The contribution of component SPAs to the relevant BDMPS population for breeding seabirds in the non-breeding season for which connectivity was identified

SPA	Percentage contribution to BDMPS population (%)											
	Fulmar			Gannet		Great black-backed gull	Kittiwake		Razorbill			Puffin
	Post-breeding	Non-breeding	Pre-breeding	Post-breeding	Pre-breeding	Non-breeding	Post-breeding	Pre-breeding	Post-breeding	Non-breeding	Pre-breeding	Non-breeding
Ailsa Craig	-	-	-	<0.01	<0.01	-	<0.01	<0.01	-	-	-	-
Buchan Ness to Collieston Coast	0.34	0.29	0.34	-	-	-	1.81	2.40	-	-	-	-
Calf of Eday	0.45	0.35	0.45	-	-	0.61	0.11	0.14	-	-	-	-
Canna & Sanday	-	-	-	-	-	-	<0.01	<0.01	-	-	-	<0.01
Cape Wrath	0.01	<0.01	0.01	-	-	-	0.02	0.03	0.01	0.19	0.01	<0.01
Copinsay	0.4	0.31	0.4	-	-	0.48	0.1	0.13	-	-	-	-
Coquet Island	-	-	-	-	-	-	-	-	-	-	-	5.32
East Caithness Cliffs	3.50	2.97	3.50	-	-	0.38	5.84	7.72	4.22	3.43	4.22	-
Fair Isle	7.3	5.57	7.3	1.38	2.21	-	0.11	0.15	0.29	0.25	0.29	1.38
Farne Islands	-	-	-	-	-	-	0.5	0.66	-	-	-	17.23
Fetlar	2.19	1.68	2.19	-	-	-	-	-	-	-	-	-
Flamborough & Filey Coast	0.22	0.18	0.22	4.85	6.23	-	5.44	7.19	3.38	2.74	3.38	0.41
Flannan Isles	0.05	<0.01	0.05	-	-	-	<0.01	<0.01	0.01	0.10	0.01	0.01
Forth Islands	-	-	-	24.32	31.27	-	0.45	0.59	0.89	0.72	0.89	26.83
Foula	4.68	3.71	4.68	-	-	-	0.05	0.06	0.12	0.10	0.12	2.91

SPA	Percentage contribution to BDMPS population (%)											
	Fulmar			Gannet		Great black-backed gull	Kittiwake		Razorbill			Puffin
	Post-breeding	Non-breeding	Pre-breeding	Post-breeding	Pre-breeding	Non-breeding	Post-breeding	Pre-breeding	Post-breeding	Non-breeding	Pre-breeding	Non-breeding
Fowlsheugh	0.05	0.04	0.05	-	-	-	1.35	1.78	1.19	0.97	1.19	-
Grasshom	-	-	-	<0.01	<0.01	-	-	-	-	-	-	-
Handa	0.01	<0.01	0.01	-	-	-	<0.01	0.01	0.03	0.47	0.03	
Hermaness, Saxa Vord and Valla Field	1.72	1.32	1.72	8.54	13.73	-	0.06	0.07	-	-	-	3.06
Hoy	4.82	3.68	4.82	-	-	0.13	0.06	0.08	-	-	-	0.45
Isles of Scilly	-	-	-	-	-	0.02	-	-	-	-	-	-
Marwick Head	-	-	-	-	-	-	0.08	0.1	-	-	-	-
Mingulay & Berneray	0.06	<0.01	0.06	-	-	-	0.01	0.01	0.07	0.92	0.07	<0.01
North Caithness Cliffs	3.51	2.68	3.51	-	-	-	1.47	1.94	0.55	0.47	0.55	0.13
North Colonsay & Western Cliffs	-	-	-	-	-	-	0.01	0.02	-	-	-	-
North Rona & Sula Sgeir	0.04	<0.01	0.04	0.4	<0.01	<0.01	<0.01	<0.01	0.01	0.10	0.01	<0.01
Noss	1.29	0.99	1.29	3.42	5.51	-	0.07	0.1	-	-	-	0.10
Rathlin Island	0.01	<0.01	0.01	-	-	-	0.02	0.03	0.10	0.70	0.10	<0.01
Rousay	0.25	0.19	0.25	-	-	-	0.26	0.34	-	-	-	-
Rum	-	-	-	-	-	-	<0.01	<0.01	-	-	-	-

SPA	Percentage contribution to BDMPS population (%)											
	Fulmar			Gannet		Great black-backed gull	Kittiwake		Razorbill			Puffin
	Post-breeding	Non-breeding	Pre-breeding	Post-breeding	Pre-breeding	Non-breeding	Post-breeding	Pre-breeding	Post-breeding	Non-breeding	Pre-breeding	Non-breeding
Shiant Isles	0.03	<0.01	0.03	-	-	-	<0.01	<0.01	0.03	0.39	0.03	0.06
Skomer, Skokholm and Seas off Pembrokeshire	-	-	-	-	-	-	<0.01	<0.01	0.04	0.27	0.04	0.02
St Abb's to Fast Castle	-	-	-	-	-	-	0.49	0.65	0.41	0.33	0.41	-
St Kilda	0.46	<0.01	0.46	2.61	<0.01	-	<0.01	<0.01	0.01	0.16	0.01	0.12
Sule Skerry & Sule Stack	-	-	-	0.20	<0.01	-	-	-	-	-	-	0.05
Sumburgh Head	0.06	0.04	0.06	-	-	-	0.03	0.04	-	-	-	-
Troup, Pennan and Lion's Heads	0.44	0.37	0.44	-	-	-	2.15	2.85	0.59	0.48	0.59	-
West Westray	0.17	0.13	0.17	-	-	-	1.74	2.30	0.18	0.15	0.18	-

Migratory waterbirds

5.1.4.15 The approach to identifying connectivity for migratory waterbirds has utilised the migratory polygons associated with Wright *et al.* (2012). Where there is overlap between these polygons and the OWF polygon, connectivity is identified between the Array Project and all SPAs at which the species is a qualifying feature in the UK. As a result, an additional step has been added to the screening approach to avoid the inclusion of an excessively large number of SPAs. This approach has utilised the collision risk modelling approach described in Wright *et al.* (2012).

5.1.4.16 The Excel workbook associated with the Strategic Ornithological Support Services (SOSS) Migration Assessment Tool (MAT) (Wright *et al.,* 2012) has been populated with the Lines of Connectivity that pass through the Scoping Boundary. The route filter has been populated to include the connections identified in Table 5.12.

Table 5.12: Connections retained for the Array Project in the SOSSMAT Excel workbook

Connection (START)	Connection (END)
Central Europe North Sea coast	Central Europe North Sea coast England eastern English Channel coast England North Sea coast Norway Orkney Scottish mainland North Sea coast Shetland
Denmark	Central Europe North Sea coast England North Sea coast Faeroe Islands Iceland Orkney Scottish mainland North Sea coast Shetland
England North Sea coast	England North Sea coast Orkney Scottish mainland North Sea coast Shetland
Norway	England North Sea coast Scottish mainland North Sea coast
Orkney	Scottish mainland North Sea coast Scottish mainland northern coast
Scottish mainland North Sea coast	Scottish mainland North Sea coast
Shetland	Scottish mainland North Sea coast

5.1.4.17 The results table in the SOSSMAT Excel workbook has been populated using population sizes from Woodward *et al.* (2020) or Wright *et al.* (2012). The population correction factor has been estimated based on the proportion of the migratory corridor in Wright *et al.* (2012) that overlaps with the region in which the Array Project is located, alongside expert judgement relating to the migratory behaviour of each species informed by other relevant literary sources (e.g. Wernham *et al.,* 2012).

5.1.4.18 Collision risk models for each species have been developed using the Band (2012) Excel workbook.

5.1.4.19 The parameters required for each model are presented in Table 5.13 alongside the source of parameter values for all species[11]. Wind farm and wind turbine parameters were consistent with the worst case wind turbine scenario for the Array Project (Table 5.14).

Table 5.13: Parameters required for migratory waterbird collision risk modelling and associated references

Parameter	Source	Species of relevance
Bird length	Robinson (2005)	All
Wingspan	Robinson (2005)	All
Flight type	All set to flapping	All
Upwind flight	All set to 50%	All
Proportion of birds at collision height	Wright et al. (2012)	All
Bird speed	Alerstam (2007)	Barnacle goose (Svalbard), bar-tailed godwit, curlew, dunlin, goldeneye, goosander, greenshank, grey plover, hen harrier, knot, lapwing, light-bellied brent goose, mallard, oystercatcher, pintail, pochard, red-breasted merganser, ringed plover, ruff, scaup, shelduck, snipe, taiga bean goose, teal, tufted duck, turnstone, whimbrel, whooper swan, wigeon
	Binford and Youngman 2010	Slavonian grebe
	Bruderer and Boldt (2001)	Short-eared owl
	Cochran and Applegate 1986	Merlin
	Surrogate values (SNH, 2014)	Black-tailed godwit, corncrake, gadwall, golden plover, great crested grebe, pink-footed goose, purple sandpiper, redshank, sanderling, shoveler
Avoidance rate	SNH (2010)	All species (98%)

Table 5.14: Wind farm and turbine parameters

Parameter	Value
Rotor radius (m)	125
Maximum rotation speed (rpm)	8.4
Monthly proportion of time operational (%)	99 (all months)
Max blade width (m)	6.8
Pitch (°)	3
Number of turbines	191

5.1.4.20 The results of collision risk modelling for each species are presented in Table 5.15 and compared to the 1% threshold of baseline mortality for the relevant biogeographic population. An LSE is identified for any species for which the impact represents more than 1% of the baseline mortality of the relevant biogeographic population.

[11] Source of information is the Morven Array Scoping Report

Table 5.15: Determination of LSE for migratory waterbirds

Species	Total collision risk (no. of birds)	Baseline mortality of biogeographic population	LSE (Y/N)
Light-bellied brent goose	<1	340	N
Barnacle goose (Svalbard)	2	2,970	N
Taiga bean goose	<1	53	N
Pink-footed goose	36	87,210	N
Whooper swan	2	3,881	N
Shelduck	<1	5,814	N
Shoveler	<1	8,190	N
Gadwall	<1	8,680	N
Wigeon	1	211,500	N
Mallard	2	251,775	N
Pintail	<1	6,740	N
Teal	1	204,450	N
Pochard	<1	10,150	N
Tufted duck	<1	40,600	N
Scaup	<1	1,216	N
Goldeneye	<1	4,830	N
Goosander	<1	2,610	N
Red-breasted merganser	<1	1,980	N
Corncrake	<1	1,571	N
Great crested grebe	<1	4,950	N
Slavonian grebe	<1	398	N
Oystercatcher	2	36,600	N
Lapwing	3	187,325	N
Golden plover	3	110,700	N
Grey plover	<1	4,690	N
Ringed plover	<1	9,690	N
Whimbrel	<1	422	N
Curlew	1	12,625	N
Bar-tailed godwit	<1	15,248	N
Black-tailed godwit	<1	2,460	N
Turnstone	<1	6,020	N
Knot	1	42,135	N
Ruff	<1	438	N
Sanderling	<1	3,485	N
Dunlin	<1	91,000	N
Purple sandpiper	<1	2,030	N

Species	Total collision risk (no. of birds)	Baseline mortality of biogeographic population	LSE (Y/N)
Snipe	5	570,900	N
Redshank	1	26,000	N
Greenshank	<1	1,245	N
Hen harrier	<1	104	N
Short-eared owl	<1	1,364	N
Merlin	<1	874	N

Factors affecting LSE

5.1.4.21 Table 5.16 considers the potential for LSE on all SPAs for which connectivity exists in the breeding season (i.e. those identified for breeding seabirds in the breeding season in section 4.5), those SPAs and associated features for which the contribution of the SPA is greater than 1% of the total BDMPS population (as identified in paragraphs 5.1.4.7 to 5.1.4.14 and Table 5.11) and those SPAs for which there is connectivity in the non-breeding season (i.e. those identified for non-breeding seabirds in section 4.5) in relation to the factors identified in paragraph 5.1.4.4.

Table 5.16: LSE matrix for SPAs in UK waters with marine ornithological features

European site and relevant qualifying features	Direct temporary habitat loss/disturbance			Indirect temporary habitat loss/ disturbance			Collision	Displacement	Barrier effects	Attraction to light
	C	O	D	C	O	D	O	O	O	O
Ailsa Craig SPA										
Gannet	× (a, c, e, f)	× (a, c, e, f)	× (a, c, e, f)	× (a, c, e, f)	× (a, c, e, f)	× (a, c, e, f)	× (a, e, f)	× (a, e, f)	× (a, e, f)	× (a, c, e, f)
Auskerry SPA										
Storm petrel	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)
Buchan Ness to Collieston Coast SPA										
Fulmar	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (f)
Herring gull	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	× (c)	× (c)	× (c)
Kittiwake	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)
Guillemot	✓	✓	✓	× (c)	× (c)	× (c)	× (c)	✓	✓	× (c)
Calf of Eday SPA										
Fulmar	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (f)
Kittiwake	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)
Cape Wrath SPA										
Fulmar	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (f)
Kittiwake	× (a, c)	× (a, c)	× (a, c)	× (a, c)	× (a, c)	× (a, c)	× (a)	× (a)	× (a)	× (c)
Copeland Islands SPA										
Manx shearwater	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)
Copinsay SPA										
Fulmar	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (f)
Kittiwake	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)

European site and relevant qualifying features	Direct temporary habitat loss/disturbance			Indirect temporary habitat loss/ disturbance			Collision	Displacement	Barrier effects	Attraction to light
	C	O	D	C	O	D	O	O	O	O
Coquet Island SPA										
Fulmar	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓
Lesser black-backed gull	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)	× (c, d)	× (c, d)	× (d)
Kittiwake	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)
Puffin	✓	✓	✓	× (c)	× (c)	× (c)	× (c)	✓	✓	× (c)
East Caithness Cliffs SPA										
Fulmar	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓
Kittiwake	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)
Razorbill	✓ (non-breeding season only)	✓ (non-breeding season only)	✓ (non-breeding season only)	× (c)	× (c)	× (c)	× (c)	✓ (non-breeding season only)	✓ (non-breeding season only)	× (c)
Fair Isle SPA										
Fulmar	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓
Gannet	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓ (non-breeding season only)	✓ (non-breeding season only)	✓ (non-breeding season only)	× (c)
Great skua	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)	× (c, d)	× (c, d)	× (c, d)
Kittiwake	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)
Puffin	✓ (non-breeding season only)	✓ (non-breeding season only)	✓ (non-breeding season only)	× (c)	× (c)	× (c)	× (c)	✓ (non-breeding season only)	✓ (non-breeding season only)	× (c)
Farne Islands SPA										
Kittiwake	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)
Guillemot	N/A	N/A	N/A	× (c)	× (c)	× (c)	N/A	N/A	N/A	× (c)
Puffin	✓	✓	✓	× (c)	× (c)	× (c)	× (c)	✓	✓	× (c)
Fetlar SPA										
Fulmar	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓

European site and relevant qualifying features	Direct temporary habitat loss/disturbance			Indirect temporary habitat loss/ disturbance			Collision	Displacement	Barrier effects	Attraction to light
	C	O	D	C	O	D	O	O	O	O
Great skua	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)	× (c, d)	× (c, d)	× (c, d)
Flamborough and Filey Coast SPA										
Gannet	× (c, e)	× (c, e)	× (c, e)	× (c, e)	× (c, e)	× (c, e)	✓ (non-breeding season only)	✓ (non-breeding season only)	✓ (non-breeding season only)	× (c)
Kittiwake	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)
Puffin	✓	✓	✓	× (c)	× (c)	× (c)	× (c)	✓	✓	× (c)
Fulmar	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓
Razorbill	✓ (non-breeding season only)	✓ (non-breeding season only)	✓ (non-breeding season only)	× (c)	× (c)	× (c)	× (c)	✓ (non-breeding season only)	✓ (non-breeding season only)	× (c)
Flannan Isles SPA										
Fulmar	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (f)
Leach's petrel	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)
Forth Islands SPA										
Gannet	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)
Lesser black-backed gull	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)	× (c, d)	× (c, d)	× (d)
Kittiwake	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)
Guillemot	N/A	N/A	N/A	× (c)	× (c)	× (c)	N/A	N/A	N/A	× (c)
Razorbill	✓	✓	✓	× (c)	× (c)	× (c)	× (c)	✓	✓	× (c)
Puffin	✓	✓	✓	× (c)	× (c)	× (c)	× (c)	✓	✓	× (c)
Foula SPA										
Fulmar	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓
Leach's petrel	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)
Great skua	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)	× (c, d)	× (c, d)	× (c, d)

European site and relevant qualifying features	Direct temporary habitat loss/disturbance			Indirect temporary habitat loss/ disturbance			Collision	Displacement	Barrier effects	Attraction to light
	C	O	D	C	O	D	O	O	O	O
Puffin	✓ (non-breeding season only)	✓ (non-breeding season only)	✓ (non-breeding season only)	× (c)	× (c)	× (c)	× (c)	✓ (non-breeding season only)	✓ (non-breeding season only)	× (c)
Fowlsheugh SPA										
Fulmar	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (f)
Herring gull	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	× (c)	× (c)	× (c)
Kittiwake	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)
Guillemot	✓	✓	✓	× (c)	× (c)	× (c)	× (c)	✓	✓	× (c)
Razorbill	✓	✓	✓	× (c)	× (c)	× (c)	× (c)	✓	✓	× (c)
Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island SPA										
Manx shearwater	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)
Handa SPA										
Fulmar	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (f)
Great skua	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)	× (c, d)	× (c, d)	× (c, d)
Kittiwake	× (a, c)	× (a, c)	× (a, c)	× (a, c)	× (a, c)	× (a, c)	× (a)	× (a)	× (a)	× (c)
Hermaness, Saxa Vord and Valla Field SPA										
Fulmar	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓
Gannet	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓ (non-breeding season only)	✓ (non-breeding season only)	✓ (non-breeding season only)	× (c)
Great skua	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)	× (c, d)	× (c, d)	× (c, d)
Puffin	✓ (non-breeding season only)	✓ (non-breeding season only)	✓ (non-breeding season only)	× (c)	× (c)	× (c)	× (c)	✓ (non-breeding season only)	✓ (non-breeding season only)	× (c)
Hoy SPA										
Fulmar	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓
Great skua	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)	× (c, d)	× (c, d)	× (c, d)

European site and relevant qualifying features	Direct temporary habitat loss/disturbance			Indirect temporary habitat loss/ disturbance			Collision	Displacement	Barrier effects	Attraction to light
	C	O	D	C	O	D	O	O	O	O
Kittiwake	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)
Puffin	✓	✓	✓	× (c)	× (c)	× (c)	× (c)	✓	✓	× (c)
Isles of Scilly SPA										
Fulmar	× (a)	× (a)	× (a)	× (a)	× (a)	× (a)	× (a)	× (a)	× (a)	× (a)
Manx shearwater	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)
Marwick Head SPA										
Kittiwake	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)
Mingulay and Berneray SPA										
Fulmar	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (f)
Mousa SPA										
Storm petrel	N/A	N/A	N/A	× (c, d)	× (c, d)	× (c, d)	N/A	N/A	N/A	× (d)
North Caithness Cliffs SPA										
Fulmar	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓
Kittiwake	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)
Puffin	✓	✓	✓	× (c)	× (c)	× (c)	× (c)	✓	✓	× (c)
North Rona and Sula Sgeir SPA										
Fulmar	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (f)
Leach's petrel	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)
Gannet	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (e, f)	× (e, f)	× (e, f)	× (c, e, f)
Northumberland Marine SPA										
Fulmar	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓
Lesser black-backed gull	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)	× (c, d)	× (c, d)	× (d)

European site and relevant qualifying features	Direct temporary habitat loss/disturbance			Indirect temporary habitat loss/ disturbance			Collision	Displacement	Barrier effects	Attraction to light
	C	O	D	C	O	D	O	O	O	O
Herring gull	× (b, c)	× (b, c)	× (b, c)	× (b, c)	× (b, c)	× (b, c)	× (b)	× (b, c)	× (b, c)	× (b, c)
Kittiwake	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)
Guillemot	× (b)	× (b)	× (b)	× (b, c)	× (b, c)	× (b, c)	× (b, c)	× (b)	× (b)	× (b, c)
Razorbill	✓	✓	✓	× (c)	× (c)	× (c)	× (c)	✓	✓	× (c)
Puffin	✓	✓	✓	× (c)	× (c)	× (c)	× (c)	✓	✓	× (c)
Noss SPA										
Fulmar	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓
Gannet	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓ (non-breeding season only)	✓ (non-breeding season only)	✓ (non-breeding season only)	× (c)
Great skua	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)	× (c, d)	× (c, d)	× (c, d)
Outer Firth of Forth and St Andrews Complex SPA										
Herring gull (non-breeding)	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	× (c)	× (c)	× (c)
Ramna Stacks and Gruney SPA										
Leach's petrel	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)
Rathlin Island SPA										
Fulmar	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (f)
Ronas Hill - North Roe and Tingon SPA										
Great skua	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)	× (c, d)	× (c, d)	× (c, d)
Rousay SPA										
Fulmar	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (f)
Kittiwake	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)

European site and relevant qualifying features	Direct temporary habitat loss/disturbance			Indirect temporary habitat loss/ disturbance			Collision	Displacement	Barrier effects	Attraction to light
	C	O	D	C	O	D	O	O	O	O
Skomer, Skokholm and the Seas off Pembrokeshire SPA										
Manx shearwater	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)	× (c, d, g)
St Abb`s Head to Fast Castle SPA										
Kittiwake	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)
Guillemot	N/A	N/A	N/A	× (c)	× (c)	× (c)	N/A	N/A	N/A	× (c)
Razorbill	✓	✓	✓	× (c)	× (c)	× (c)	× (c)	✓	✓	× (c)
St Kilda SPA										
Fulmar	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (f)
Manx shearwater	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)
Leach's petrel	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)
Gannet	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓ (non-breeding season only)	✓ (non-breeding season only)	✓ (non-breeding season only)	× (c)
Great skua	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)	× (c, d)	× (c, d)	× (c, d)
Sule Skerry and Sule Stack SPA										
Storm petrel	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)
Leach's petrel	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (c, d)	× (d)
Gannet	× (c, e)	× (c, e)	× (c, e)	× (c, e)	× (c, e)	× (c, e)	× (e)	× (e)	× (e)	× (c, e)
Sumburgh Head SPA										
Fulmar	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (f)
The Shiant Isles SPA										
Fulmar	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (f)
Treshnish Isles SPA										
Storm petrel	× (a, c, d)	× (a, c, d)	× (a, c, d)	× (a, c, d)	× (a, c, d)	× (a, c, d)	× (a, c, d)	× (a, c, d)	× (a, c, d)	× (a, d)

European site and relevant qualifying features	Direct temporary habitat loss/disturbance			Indirect temporary habitat loss/ disturbance			Collision	Displacement	Barrier effects	Attraction to light
	C	O	D	C	O	D	O	O	O	O
Troup, Pennan and Lion`s Heads SPA										
Fulmar	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (f)
Kittiwake	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)
Guillemot	N/A	N/A	N/A	× (c)	× (c)	× (c)	N/A	N/A	N/A	× (c)
Razorbill	✓	✓	✓	× (c)	× (c)	× (c)	× (c)	✓	✓	× (c)
West Westray SPA										
Fulmar	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (c, f)	× (f)
Kittiwake	× (c)	× (c)	× (c)	× (c)	× (c)	× (c)	✓	✓	✓	× (c)

The text below explains 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. **Foraging distances applied over land:** The Screening Tool does not discriminate between land and sea and there are occasions where the foraging range of a feature appears to intersect with the Scoping Boundary, but this has only occurred because the tool has projected this range across an intervening land mass. It is highly unlikely that seabirds will traverse significant distances over land in order to forage. In these cases a judgement is made as to whether connectivity would still be indicated if foraging was restricted only to sea areas.

b. **Foraging ranges applied to foraging areas:** The boundaries designated for certain SPAs incorporate foraging areas utilised by birds from colonies that either form part of the same SPA or are designated as part of another SPA. In these cases it is incorrect to apply an additional foraging to the SPA boundary as this would over-estimate the foraging area utilised by relevant features. Where an LSE is identified for a functionally linked seabird colony SPAs and the Array Project then an LSE is also identified for the SPA designated to protect associated foraging areas. This approach follows NatureScot (2023a) guidance.

c. **Vulnerability of species to impacts associated with offshore wind farms:** The first stage of the screening exercise has been conducted assuming that all impacts are applicable to all features. This is, however, not realistic with some species having no vulnerability to certain impacts. Table 5.17 identifies the vulnerability for each species for which potential connectivity between the Array Project and an SPA or Ramsar at which they are a feature has been identified, using the vulnerability scores presented in Wade *et al.* (2016). Assessments for collision will only be undertaken if a feature has a vulnerability of Moderate or higher. Assessments for displacement and barrier effects will only be undertaken if a feature has a vulnerability to 'displacement associated with structures' of Moderate or higher and/or a Low habitat flexibility. The exception to the latter criteria is black-legged kittiwake, for which assessments for displacement associated with structures will be undertaken based on the advice of NatureScot and the Marine Directorate to previous OWF projects in Scottish waters which required the consideration of kittiwake in displacement assessments. Assessments for direct temporary habitat loss/disturbance will only be undertaken if a feature has a vulnerability to 'displacement associated with vessels/helicopters' of Moderate or higher and/or a Low habitat flexibility. Assessments for indirect temporary habitat loss/disturbance will only be

conducted where a species has a low habitat flexibility. Assessments for attraction to light will only be undertaken where a species has a nocturnal activity of High. Those species for which vulnerability to certain impacts is considered too low to result in LSE are identified in Table 5.17, using green shading.

d. **Abundance of species at the Scoping Boundary (breeding season):** During baseline aerial surveys in the breeding season, only one lesser black-backed gull was recorded (April 2021) and only one great skua (August 2021) with this more likely to represent a non-breeding bird or a bird on early migration. No storm petrels or Leach's petrels were identified to species level, with only four unidentified storm petrels recorded (June 2021, August 2021 and October 2021) with these again likely to represent non-breeding birds or birds on migration. There are no SPA breeding colonies of Manx shearwater in the North Sea, however, birds do occur in the Firth of Forth towards the end of the breeding season and this is reflected in the baseline aerial survey data. However, these are considered unlikely to be breeding birds from the colonies for which connectivity has been identified due to the distances between these colonies and the Array Project. Distribution data from Waggitt *et al.* (2019) and Kober *et al.* (2010) indicate only limited densities of Leach's petrel, storm petrel and Manx shearwater would be expected in the Scoping Boundary during the breeding season. It is, therefore, considered that due to the low abundance of the species there is no potential for an LSE in the breeding season for any of the SPAs for which potential connectivity was identified.

e. **Site-specific foraging range data (gannet):** The foraging range tool used to identify potential connectivity between the Scoping Boundary and SPAs in the breeding season incorporates a number of site specific foraging ranges for certain colonies. However, there is further information that would suggest connectivity between the Array Project and some of the SPAs at which northern gannet is a qualifying feature does not exist. Northern gannet are known to exhibit segregation in relation to the foraging areas utilised by birds from different breeding colonies (Wakefield *et al.,* 2013). The area of the Scottish North Sea in which the Array Project is located is utilised by birds from the Forth Islands SPA (Wakefield *et al.*, 2013). LSE is, therefore, only identified for gannet in the breeding season at the Forth Islands SPA.

f. **Breeding seabirds in the non-breeding season:** See paragraphs 5.1.4.7 to 5.1.4.14.

g. **Site specific foraging range data (Manx shearwater):** Dean *et al.* (2012) presents tracking data for Manx shearwater at breeding colonies located within the Copeland Islands SPA, Rum SPA and Skomer, Skokholm and Seas off Pembrokeshire SPA. The tracking data presented shows no connectivity with the Array Project and, therefore, no LSE is identified for these SPAs. Birds from the Copeland Islands SPA and Skomer, Skokholm and Seas off Pembrokeshire SPA are utilising foraging areas associated with the Irish Sea Front. It is considered that birds from other SPAs for which connectivity with the Array Project has been identified, on the western coast of the UK, will also utilise this area and show no connectivity with the Scoping Boundary and, therefore, LSE is also discounted for the Isles of Scilly SPA and Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island SPA.

Table 5.17: Vulnerability of all features for which connectivity was identified with the impacts that may result in an LSE to inform the determination of LSE. Green shading identifies those species for which the vulnerability is considered too low to result in LSE

Species	Collision [12]	Displacement associated with structures (physical presence, (visual disturbance/displacement and barrier effects)) [13]	Disturbance associated with vessels/helicopters (physical presence, visual disturbance/displacement and barrier effects, underwater sound, above water sound) [13]	Habitat flexibility (indirect physical impact (to habitat), habitat loss/gain, direct physical impact (to habitat), suspended sediments) [14]	Proportion of flight activity at night [15]
Fulmar	Very Low	Very Low	Very Lo	High	High
Leach's petrel	Low	Very Low	Very Low	High	High
Gannet	High	High	Very low	High	Low
Manx shearwater	Very Low	Very Low	Very Low	High	Moderate
Great skua	Very High	Very Low	Very Low	Moderate	Very Low
Kittiwake	Very High	Low	Low	Moderate	Moderate
Puffin	Very Low	Moderate	Moderate	Moderate	Very Low
Storm petrel	Low	Very low	Very low	High	High
Herring gull	Very High	Low	Very Low	High	Moderate
Guillemot	Very Low	High	Moderate	Moderate	Low
Razorbill	Very Low	High	Moderate	Moderate	Very Low
Lesser black-backed gull	Very High	Low	Very Low	High	Moderate

[12] Wade *et al.,* (2016) provides a vulnerability score which has been translated as follows: >200 = Very High, 101-200 = High, 51-100 = Moderate, 1-50 = Low, 0 = Very Low

[13] The numerical rankings in Wade *et al.* (2016) have been translated to vulnerability as follows: 5 = Very High, 4 = High, 3 = Moderate, 2 = Low and 1 = Very Low

[14] The numerical rankings in Wade *et al.* (2016) have been translated to vulnerability as follows: 4 = Low, 3 = Moderate, 2 = Moderate and 1 = High

[15] The numerical rankings in Wade *et al.* (2016) have been translated to vulnerability as follows: 5 = Very High, 4 = High, 3 = Moderate, 2 = Low and 1 = Very Low

LSE in-combination

5.1.4.22 The LSE test requires consideration of the Array Project alone and/or in-combination with other plans and projects. The focus at this stage should be to identify sites/features for which no LSE alone was concluded, but which there is potential for an 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).

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

5.1.4.24 For marine ornithology features, the potential for LSE alone is identified for all sites with the potential to be affected, therefore, effects in-combination will be considered at Appropriate Assessment.

6 Approach to In-combination Assessment

6.1.1.1 This section describes the proposed approach to the in-combination assessment for the Array Project. In-combination effects are defined as those that result from incremental changes caused by other reasonably foreseeable plans and projects alongside the Array Project. In-combination effects are, therefore, the combined effects on the same single receptor/resource of the assessed project considered along with the effects from a number of other, different plans and projects. A fundamental requirement of undertaking the in-combination assessment is to identify those plans or projects with which the Array Project may interact to produce in-combination effects, where there is sufficient information available to undertake an assessment. In-combination effects have the potential to arise during the construction, O&M and decommissioning phases.

6.1.1.2 The Transmission Project will be treated as another plan or project with the potential to contribute to an in-combination effect and will be assessed as part of the in-combination assessment for the Array Project.

6.1.1.3 If available, and practicable, the in-combination assessment will use the Marine Directorate Cumulative Effects Framework (CEF) tool. The CEF tool has been produced with the aim of developing methods to facilitate the robust assessment of cumulative effects using a consistent and transparent approach to the collation and analysis of the best available data. The CEF will do this through the development of the following tools:

- a data library, holding the key knowledge, parameters and data that feed into each of the modelling tools;
- an R package that contains functions to run each of the modelling tools, link them together in feasible combinations and perform a project-level or cumulative assessment;
- a user interface that allows non-technical users to generate predicted impacts at a population level for both individual projects and cumulative assessments, with a clear audit trail to provide transparency and reproducibility.

6.1.1.4 The CEF will provide a baseline of current effects and the flexibility to add new projects to produce an updated CEA, for both project level and cumulative effects.

7 Summary of LSE

7.1.1.1 Table 7.1 provides a summary of the European sites, qualifying interest features and potential impacts for which LSE has been identified as a result of the Array Project alone and/or in combination with other plans or projects. The table excludes all features that have been screened out as no LSE has been identified. These sites and features will be taken forward for consideration in the RIAA.

7.1.1.2 In total, 30 SACs are being taken forward for consideration in the RIAA. No European sites were considered for LSE with Annex I habitats (offshore and coastal) listed as qualifying features.

7.1.1.3 Six SACs were considered for Annex II diadromous fish species in section 5.1.2. All six of these European sites were progressed to the RIAA with respect to the following impacts:

- underwater sound impacting fish and shellfish receptors (alone and in-combination);
- EMF from subsea electrical cabling.

7.1.1.4 With respect to marine mammals, the assessment of LSE undertaken in section 5.1.3, considered 24 European sites (including 5 SACs in the UK and 19 transboundary sites). Of these, LSE could not be discounted with respect to the following impacts for the 5 UK European sites considered:

- underwater sound from piling (alone and in-combination);
- underwater sound from clearance of UXO clearance (alone and in-combination);
- underwater sound from pre-construction site surveys (alone and in-combination).

7.1.1.5 In total, 43 SPAs were considered for offshore ornithology features. If these, 23 European sites were progressed (for the features identified in Table 7.1) to the RIAA with respect to the following impacts:

- direct temporary habitat loss/disturbance (alone and in-combination);
- indirect temporary habitat loss/ disturbance (alone and in-combination);
- collision (alone and in-combination);
- displacement (alone and in-combination);
- barrier effects (alone and in-combination);
- attraction to light (alone and in-combination).

Table 7.1: Summary of the European sites and relevant qualifying features for which LSEs have been identified and further assessment in the RIAA is required

✓= LSE during project phase, C = construction, O = O&M, D = decommissioning ✓* = non-breeding season only

European site	Distance to Array Project (km)	Relevant qualifying features	Impact	Project phase		
				C	O	D
River Dee SAC	63.5	Atlantic salmon Freshwater pearl mussel	Underwater sound impacting fish and shellfish receptors (alone)	✓		
			Underwater sound impacting fish and shellfish receptors (in-combination)	✓		
			EMF from subsea electrical cabling (alone)		✓	
			EMF from subsea electrical cabling (in-combination)		✓	
River South Esk SAC	82	Atlantic salmon Freshwater pearl mussel	Underwater sound impacting fish and shellfish receptors (alone)	✓		
			Underwater sound impacting fish and shellfish receptors (in-combination)	✓		
			EMF from subsea electrical cabling (alone)		✓	
			EMF from subsea electrical cabling (in-combination)		✓	
River Tweed SAC	113	Atlantic salmon	Underwater sound impacting fish and shellfish receptors (alone)	✓		
			Underwater sound impacting fish and shellfish receptors (in-combination)	✓		
			EMF from subsea electrical cabling (alone)		✓	
			EMF from subsea electrical cabling (in-combination)		✓	
River Tay SAC	136	Atlantic salmon	Underwater sound impacting fish and shellfish receptors (alone)	✓		
			Underwater sound impacting fish and shellfish receptors (in-combination)	✓		
			EMF from subsea electrical cabling (alone)		✓	
			EMF from subsea electrical cabling (in-combination)		✓	
River Teith SAC	218	Atlantic salmon	Underwater sound impacting fish and shellfish receptors (alone)	✓		
			Underwater sound impacting fish and shellfish receptors (in-combination)	✓		
			EMF from subsea electrical cabling (alone)		✓	
			EMF from subsea electrical cabling (in-combination)		✓	

European site	Distance to Array Project (km)	Relevant qualifying features	Impact	Project phase		
				C	O	D
Firth of Tay and Eden Estuary SAC	95.9	Harbour seal	Injury and disturbance from underwater sound generated from piling (alone)	✓		
			Injury and disturbance from underwater sound generated from piling (in-combination)	✓		
			Injury and disturbance from underwater sound generation from UXO clearance (alone)	✓		
			Injury and disturbance from underwater sound generation from UXO clearance (in-combination)	✓		
			Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities (alone).	✓	✓	✓
			Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities (in-combination)	✓	✓	✓
			Disturbance to marine mammals from pre-construction surveys (alone)	✓		
			Disturbance to marine mammals from pre-construction surveys (in-combination)	✓		
Berwickshire and North Northumberland Coast SAC	97.2	Grey seal	Injury and disturbance from underwater sound generated from piling (alone)	✓		
			Injury and disturbance from underwater sound generated from piling (in-combination)	✓		
			Injury and disturbance from underwater sound generation from UXO clearance (alone)	✓		
			Injury and disturbance from underwater sound generation from UXO clearance (in-combination)	✓		
			Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities (alone).	✓	✓	✓
			Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities (in-combination)	✓	✓	✓
			Disturbance to marine mammals from pre-construction surveys (alone)	✓		
			Disturbance to marine mammals from pre-construction surveys (in-combination)	✓		
Isle of May SAC	104.6	Grey seal	Injury and disturbance from underwater sound generated from piling (alone)	✓		
			Injury and disturbance from underwater sound generated from piling (in-combination)	✓		
			Injury and disturbance from underwater sound generation from UXO clearance (alone)	✓		
			Injury and disturbance from underwater sound generation from UXO clearance (in-combination)	✓		

European site	Distance to Array Project (km)	Relevant qualifying features	Impact	Project phase		
				C	O	D
			Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities (alone).	✓	✓	✓
			Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities (in-combination)	✓	✓	✓
			Disturbance to marine mammals from pre-construction surveys (alone)	✓		
			Disturbance to marine mammals from pre-construction surveys (in-combination)	✓		
Southern North Sea SAC	135	Harbour porpoise	Injury and disturbance from underwater sound generated from piling (alone)	✓		
			Injury and disturbance from underwater sound generated from piling (in-combination)	✓		
			Injury and disturbance from underwater sound generation from UXO clearance (alone)	✓		
			Injury and disturbance from underwater sound generation from UXO clearance (in-combination)	✓		
			Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities (alone).	✓	✓	✓
			Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities (in-combination)	✓	✓	✓
			Disturbance to marine mammals from pre-construction surveys (alone)	✓		
			Disturbance to marine mammals from pre-construction surveys (in-combination)	✓		
Moray Firth SAC	182	Bottlenose dolphin	Injury and disturbance from underwater sound generated from piling (alone)	✓		
			Injury and disturbance from underwater sound generated from piling (in-combination)	✓		
			Injury and disturbance from underwater sound generation from UXO clearance (alone)	✓		
			Injury and disturbance from underwater sound generation from UXO clearance (in-combination)	✓		
			Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities (alone).	✓	✓	✓
			Disturbance to marine mammals from vessel use and other (non-piling) sound-producing activities (in-combination)	✓	✓	✓
			Disturbance to marine mammals from pre-construction surveys (alone)	✓		

European site	Distance to Array Project (km)	Relevant qualifying features	Impact	Project phase		
				C	O	D
			Disturbance to marine mammals from pre-construction surveys (in-combination)	✓		
Buchan Ness to Collieston Coast SPA	68	Herring gull	Collision		✓	
		Kittiwake	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	
		Guillemot	Direct temporary habitat loss/disturbance	✓	✓	✓
			Displacement		✓	
			Barrier effects		✓	
Calf of Eday SPA	273	Kittiwake	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	
Copinsay SPA	237	Kittiwake	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	
Coquet Island SPA	132	Fulmar	Attraction to light		✓	
		Kittiwake	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	
		Puffin	Direct temporary habitat loss/disturbance	✓	✓	✓
			Displacement		✓	
			Barrier effects		✓	
East Caithness Cliffs SPA	199	Kittiwake	Collision		✓	
			Displacement		✓	

European site	Distance to Array Project (km)	Relevant qualifying features	Impact	Project phase		
				C	O	D
			Barrier effects		✓	
		Fulmar	Attraction to light		✓	
		Razorbill	Direct temporary habitat loss/disturbance	✓*	✓*	✓*
			Displacement		✓*	
			Barrier effects		✓*	
Fair Isle SPA	289	Fulmar	Attraction to light		✓	
		Gannet	Collision		✓*	
			Displacement		✓*	
			Barrier effects		✓*	
		Kittiwake	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	
		Puffin	Direct temporary habitat loss/disturbance	✓	✓	✓
			Displacement		✓*	
			Barrier effects		✓*	
Farne Islands SPA	103	Kittiwake	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	
		Puffin	Direct temporary habitat loss/disturbance	✓	✓	✓
			Displacement		✓	
			Barrier effects		✓	
Fetlar SPA	405	Fulmar	Attraction to light		✓	

European site	Distance to Array Project (km)	Relevant qualifying features	Impact	Project phase		
				C	O	D
Flamborough and Filey Coast SPA	243	Gannet	Collision		✓*	
			Displacement		✓*	
			Barrier effects		✓*	
		Kittiwake	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	
		Puffin	Direct temporary habitat loss/disturbance	✓	✓	✓
			Displacement		✓	
			Barrier effects		✓	
		Fulmar	Attraction to light		✓	
		Razorbill	Direct temporary habitat loss/disturbance	✓*	✓*	✓*
			Displacement		✓*	
			Barrier effects		✓*	
Forth Islands SPA	101	Gannet	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	
		Kittiwake	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	
		Razorbill	Direct temporary habitat loss/disturbance	✓	✓	✓
			Displacement		✓	
			Barrier effects		✓	
		Puffin	Direct temporary habitat loss/disturbance	✓	✓	✓

European site	Distance to Array Project (km)	Relevant qualifying features	Impact	Project phase		
				C	O	D
			Displacement		✓	
			Barrier effects		✓	
Foula SPA	359	Fulmar	Attraction to light		✓	
		Puffin	Direct temporary habitat loss/disturbance	✓*	✓*	✓*
			Displacement		✓*	
			Barrier effects		✓*	
Fowlsheugh SPA	59	Herring gull	Collision		✓	
		Kittiwake	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	
		Guillemot	Direct temporary habitat loss/disturbance	✓	✓	✓
			Displacement		✓	
			Barrier effects		✓	
		Razorbill	Direct temporary habitat loss/disturbance	✓	✓	✓
			Displacement		✓	
			Barrier effects		✓	
Hermaness, Saxa Vord and Valla Field SPA	425	Fulmar	Attraction to light		✓	
		Gannet	Collision		✓*	
			Displacement		✓*	
			Barrier effects		✓*	
		Puffin	Direct temporary habitat loss/disturbance	✓*	✓*	✓*
			Displacement		✓*	
			Barrier effects		✓*	

European site	Distance to Array Project (km)	Relevant qualifying features	Impact	Project phase		
				C	O	D
Hoy SPA	243	Fulmar	Attraction to light		✓	
		Kittiwake	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	
		Puffin	Direct temporary habitat loss/disturbance	✓	✓	✓
			Displacement		✓	
			Barrier effects		✓	
Marwick Head SPA	277	Kittiwake	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	
North Caithness Cliffs SPA	218	Fulmar	Attraction to light		✓	
		Kittiwake	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	
		Puffin	Direct temporary habitat loss/disturbance	✓	✓	✓
			Displacement		✓	
			Barrier effects		✓	
Northumberland Marine SPA	93	Fulmar	Attraction to light		✓	
		Kittiwake	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	
		Puffin	Direct temporary habitat loss/disturbance	✓	✓	✓
			Displacement		✓	

European site	Distance to Array Project (km)	Relevant qualifying features	Impact	Project phase		
				C	O	D
			Barrier effects		✓	
		Razorbill	Direct temporary habitat loss/disturbance	✓	✓	✓
			Displacement		✓	
			Barrier effects		✓	
Noss SPA	357	Fulmar	Attraction to light		✓	
		Gannet	Collision		✓*	
			Displacement		✓*	
			Barrier effects		✓*	
Outer Firth of Forth and St Andrews Complex SPA	68	Collision	Herring gull (non-breeding)		✓	
Rousay SPA	274	Kittiwake	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	
St Abb`s Head to Fast Castle SPA	103	Kittiwake	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	
		Razorbill	Direct temporary habitat loss/disturbance	✓	✓	✓
			Displacement		✓	
			Barrier effects		✓	
St Kilda SPA	448	Gannet	Collision		✓*	
			Displacement		✓*	
			Barrier effects		✓*	

European site	Distance to Array Project (km)	Relevant qualifying features	Impact	Project phase		
				C	O	D
		Kittiwake	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	
		Razorbill	Direct temporary habitat loss/disturbance	✓	✓	✓
			Displacement		✓	
			Barrier effects		✓	
Troup, Pennan and Lion's Heads SPA	107	Kittiwake	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	
		Razorbill	Direct temporary habitat loss/disturbance	✓	✓	✓
			Displacement		✓	
			Barrier effects		✓	
West Westray SPA	285	Kittiwake	Collision		✓	
			Displacement		✓	
			Barrier effects		✓	

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Appendix A

Appendix Table 1: Natural 2000 Standard Data Forms for all European Sites considered in this HRA Stage 1 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			
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	✓
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 Teith SAC	UK0030263	https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030263.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	DE0916391	https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=DE0916391	✗

European site	Site code	Link to Natura 2000 Standard Data Form	Screened in for further assessment in the RIAA
angrenzende Küstengebiete			
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=NL2008002	×
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	×
Birds			
Buchan Ness to Collieston Coast SPA	UK9002491	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002491.pdf	✓
Calf of Eday SPA	UK9002431	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002431.pdf	✓
Copinsay SPA	UK9002151	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002151.pdf	✓
Coquet Island SPA	UK9006031	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9006031.pdf	✓
East Caithness Cliffs SPA	UK0030143	https://jncc.gov.uk/jncc-assets/SAC-N2K/UK0030143.pdf	✓

European site	Site code	Link to Natura 2000 Standard Data Form	Screened in for further assessment in the RIAA
Fair Isle SPA	UK9002091	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002091.pdf	✓
Farne Islands SPA	UK9006021	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9006021.pdf	✓
Fetlar SPA	UK9002031	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002031.pdf	✓
Flamborough & Filey Coast SPA	UK9006101	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9006101.pdf	✓
Forth Islands SPA	UK9004171	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9004171.pdf	✓
Foula SPA	UK9002061	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002061.pdf	✓
Fowlsheugh SPA	UK9002271	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002271.pdf	✓
Hermaness, Saxa Vord and Valla Field SPA	UK9002011	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002011.pdf	✓
Hoy SPA	UK9002141	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002141.pdf	✓
Marwick Head SPA	UK9002121	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002121.pdf	✓
North Caithness Cliffs SPA	UK9001181	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9001181.pdf	✓
Northumberland Marine SPA	UK9020325	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9020325.pdf	✓
Noss SPA	UK9002081	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002081.pdf	✓
Outer Firth of Forth and St Andrews Complex SPA	UK9020316	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9020316.pdf	✓
Rousay SPA	UK9002371	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002371.pdf	✓
St Abb`s Head to Fast Castle SPA	UK9004271	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9004271.pdf	✓
St Kilda SPA	UK9001031	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9001031.pdf	✓
Troup, Pennan and Lion`s Heads SPA	UK9002471	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002471.pdf	✓
West Westray SPA	UK9002101	https://jncc.gov.uk/jncc-assets/SPA-N2K/UK9002101.pdf	✓