Orbital Marine Power

Orbital Marine Power - Habitat Regulations Appraisal (HRA) Screening

Westray Tidal Array Habitat Regulations Appraisal (HRA) Likely Significant Effect (LSE) Screening Assessment

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CONTENTS

ACRONYMS

ACRONYM	DEFINITION
AA	Appropriate Assessment
ADCP	Acoustic Doppler Current Profiler
AfL	Area for Lease
BBWF	Berwick Bank Wind Farm
CEMP	Construction Environmental Management Plan
CfD	Contract for Difference
CMS	Construction Method Statement
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMEC	European Marine Energy Centre
EMF	Electro-magnetic Field
GNSS	Global Navigational Satellite System
HPU	Hydraulic Power Unit
HRA	Habitat Regulations Assessment
HVDC	High Voltage Directional Current
IROPI	Reasons of Overriding Public Interest
LMP	Lighting Management Plan
LSE	Likely Significant Effect
MARPOL	The Prevention of Pollution from Ships
MCA	Maritime Coastguard Agency
MHWS	Mean High Water Springs
MMFR	Mean Maximum Foraging Range
MINNS	Marine Invasive Non Native Species
MPCP	Marine Pollution Contingency Plan
MU	Management Unit
NLB	Northern Lighthouse Board
NPS	National Policy Statement
NRA	Navigational Risk Assessment
OEMP	Operation Environmental Management Plan
OIC	Orkney Islands Council
PAD	Protocol for Archaeological Discoveries

ACRONYM	DEFINITION
PDE	Project Design Envelope
PFOWF	Pentland Floating Offshore Wind Farm
RHIB	Rigid-Hulled Inflatable Boat
RIAA	Report to Inform an Appropriate Assessment
RNLI	Royal National Lifeboat Institution
ROV	Remotely Operated Vehicle
RYA	Royal Yachting Association
SCADA	Supervisory Control and Data Acquisition
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SSC	Suspended Sediment Concentration
VMP	Vessel Management Plan
WEC	Wave Energy Converter
WSI	Written Scheme of Investigation
ZoI	Zone of Influence

1 INTRODUCTION

1.1 Background

This Habitat Regulations Appraisal (HRA) Screening Report has been prepared to support a request for a Screening Opinion from Scottish Ministers in relation to the Westray Tidal Array, located in the Westray Firth, Orkney (hereafter 'Westray' or 'Project'). The HRA Screening Report evaluates the potential for connectivity and Likely Significant Effects (LSE) on European sites as a result of the Project.

Orbital Marine Power (hereafter referred to as 'Orbital') is a Scottish company, based in Orkney and Edinburgh. Formerly ScotRenewables Tidal Power Ltd, Orbital has been developing and testing its tidal stream technology for 20 years, with a key objective to tackle climate change, delivering sustainable development and supporting the global transition away from fossil fuels.

The 2010 Pentland Firth and Orkney Waters leasing round was informed by a Scottish Marine Renewable Strategic Environmental Appraisal (Faber Maunsell and METOC, 2007), which included an energy resource assessment and review of environmental, human and physical constraints. Lease areas including the former Westray South Agreement for Lease (AfL) area were then identified and subject to a plan-level HRA (Marine Scotland, 2016). In 2021, Orbital carried out a review of potential marine locations across the UK for deployment of its technology. The main considerations for selection of preferred sites were environmental, engineering and economic factors, i.e. areas of strong tidal current speeds, sufficient water depths, available grid capacity with least potential for significant environmental effects. The Westray Project site located in the Orkney Islands, between Eday and Egilsay (Figure 1-1) was selected for the following reasons:

- High tidal stream energy (c. 7 – 11 kW/m^2) and generally suitable water depths for Orbital tidal technology;
- Seabed gradient within acceptable limits for the technology;
- Potential for a suitable export cable landfall site (at the European Marine Energy Centre (EMEC) Tidal Test site) and a reasonably non-complex seabed terrain for the cable corridor;
- Does not overlap with any sites designated for ornithological or ecological interests at European, national or local levels;
- No nearby nationally designated areas for landscape value;
- No Historic Marine Protected Areas of Protected Military Remains within the proposed site;
- Situated away from any river estuaries or narrow channels where salmonids may be funnelled or congregate;
- Situated within a Tidal Options plan area identified within Scottish Sector Marine Power for Wind, Wave and Tidal (2013);
- Situated outside of Statutory Harbour areas;
- Not situated in a narrow channel where shipping and other sea-users would be impeded;
- No telecoms cables, hydrocarbon pipelines or inshore telecoms cables within the site; and
- No known marine aggregations or dredging sites in proximity to the site.

The Westray Project has now been refined by Orbital, to take account of the depth and tidal range most suitable for the deployment of the Orbital O2-X (hereafter referred to as 'O2-X') device within the Project area. The O2-X device is a tidal turbine that has been deployed successfully in Orkney at the EMEC. The floating O2-X technology eases installation and access for maintenance, representing a breakthrough in technology cost and risk compared to alternative marine renewable devices. It also captures the strongest tidal currents, providing higher yield, as these

exist close to the surface, rather than at the seabed. Further information on the O2-X device is provided in Section 3.2.1.1.

1.2 Project Overview

This Habitats Regulation Appraisal (HRA) Screening Report has been prepared to support the Section 36 Consent and Marine Licence applications for the Project. The key components of the Project are summarised below, with further details included in Section 3:

- Up to 70 O2-X devices, which are floating at the sea surface;
- Inter-array / umbilical cables between devices;
- Up to five export cables from the O2-X devices at Westray to connect to EMEC's offshore transmission infrastructure, being consented under EMEC's Project application; and
- Navigation markers as required.

The Project is to be located entirely offshore and will be built out in stages across the proposed maximum site area, with the consent application only relating to infrastructure and assets within the Project boundary, which is entirely below the Mean High Water Spring (MHWS). The Project Design Envelope (PDE) does not include any potential future onshore works, which would require consideration under the Town and Country Planning (Scotland) Act 1997. The Westray Project is adjacent to the EMEC Fall of Warness tidal demonstration site, which is also illustrated in Figure 1-1. It is intended that energy generated at Westray will be exported through the adjacent EMEC Fall of Warness export cables and connected to the National Grid at the EMEC facility on Eday, EMEC is currently seeking the necessary consents to increase the export capacity from their site. As the Westray Project will connect to the National Grid and make cable landfall at the EMEC facility, the Westray Section 36 application will only comprise the offshore infrastructure within the Westray Tidal Array area, comprising the tidal array development (O2-X devices and inter-array / umbilical cables) and the subtidal export cable(s) between the Westray development and the EMEC Fall of Warness tidal demonstration site.

A Scoping Report (Orbital, 2023) was submitted for the Project in December 2023, with a Scoping Opinion received from Marine Directorate – Licensing Operations Team (MD-LOT) in October 2024.

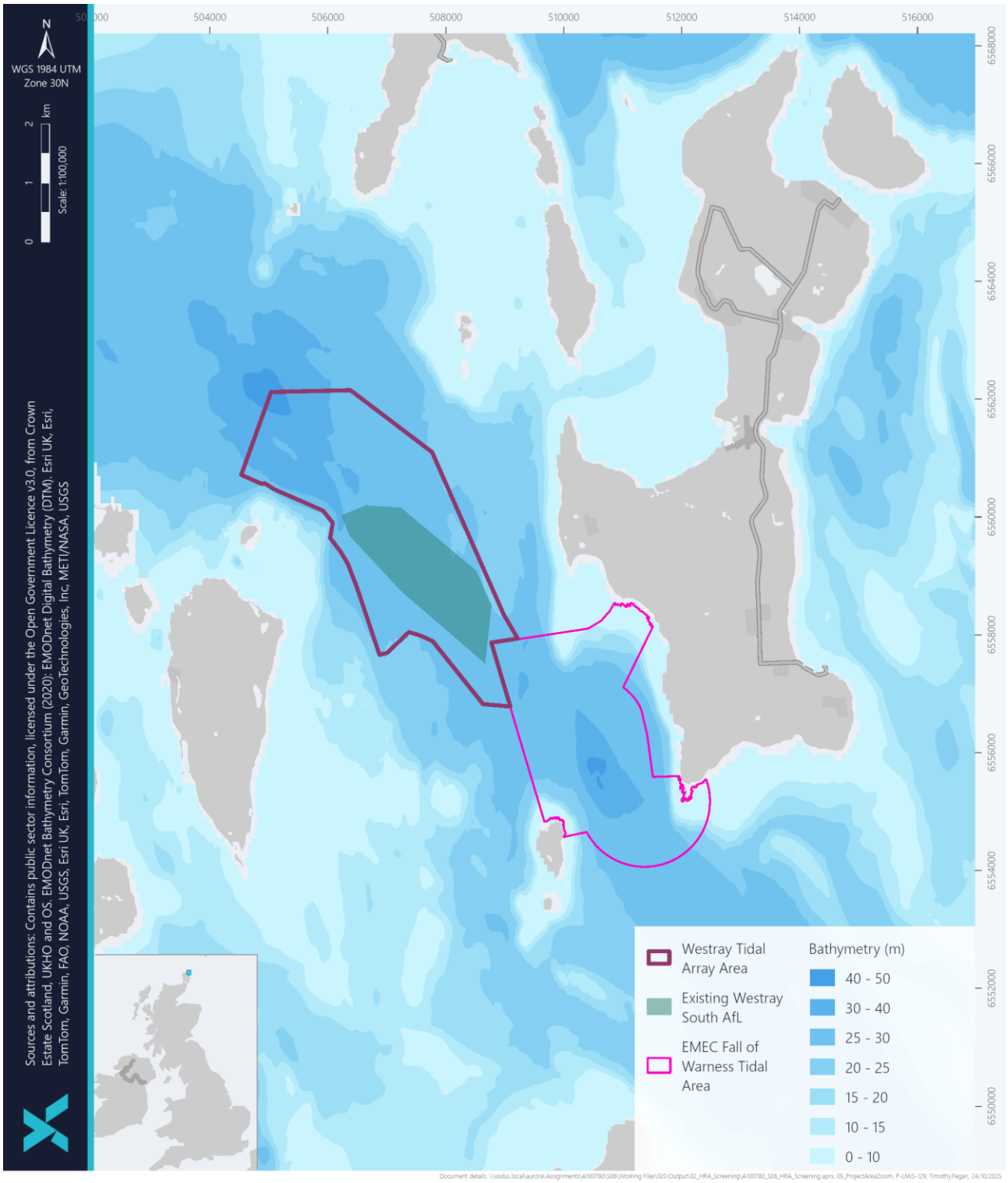

Figure 1-1 Westray Project Area and the adjacent EMEC Fall of Warness tidal demonstration site

1.3 Purpose of This Report

The requirement and process for consideration of potential impacts on plans and projects on European sites are required under the European Union's (EU) Habitat's Directive[1]. The Habitat Directive stipulate that an HRA must be carried out for any plans and projects likely to have LSE on European sites, for example through spatial connectivity or designated features with an assumed connectivity. Further information on this process and requirements is detailed in Section 2 below.

This HRA Screening Report informs the HRA process for the Project with respect to the LSE on European sites which could be affected by the Project. Where no potential LSE is predicted on a European site, then the designated site is screened out and no further assessment will be conducted. Where initial screening identifies that LSE cannot be excluded, the assessment for European sites will be presented within the Report to Inform Appropriate Assessment (RIAA), which will be submitted alongside the Environmental Impact Assessment Report (EIAR) supporting the Section 36 (S36) consent and Marine Licence (ML) applications for the Project. A Scoping Report (Orbital, 2023) was submitted for the Project in December 2023, with a Scoping Opinion received from Marine Directorate – Licensing Operations Team (MD-LOT) in October 2024, with relevant comments from the Scoping Opinion also informing the completed HRA Screening Assessment. This HRA Screening Report considers the potential effects arising during the installation, operation and maintenance, and decommissioning phases of the offshore elements of the Project, with respect to the following receptor topics:

- Annex I habitats;
- Marine mammal features (including cetaceans, pinnipeds and Eurasian otter); and
- Ornithology features.

Diadromous fish are excluded from this assessment based on recent NatureScot guidance, with potential impacts to be addressed in the Project's EIAR, as discussed further in Section 4.2. The completed HRA Screening Assessment uses existing information about the baseline environment in the Project area and the proposed activities. Any further input derived from stakeholder engagement which may have consequences on the outcomes of this assessment will be captured and assessed within the RIAA.

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

2 THE HRA PROCESS

2.1 Legislative Context

The following legislation requires the consideration of potential effects of plans and projects on European sites ('The Habitats Regulations'):

- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) – applicable to Marine Licence applications out to the 12 NM limit; and
- The Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended) – applicable to Marine Licence applications between the 12 and 200 NM limits.

The Habitats Regulations require evaluation of potential effects from proposed projects and plans on European sites. These include Special Areas of Conservation (SACs), candidate SACs (cSACs), Special Protection Areas (SPAs) potential SPAs (pSPAs), Sites of Community Interest (SCIs) and Ramsar sites. The consideration of Ramsar sites as European sites in the HRA process was recently provided in an update to a Scottish Government policy position[2] on the protection of Ramsar sites in Scotland, published on 9th July 2025. The determination of the potential for a plan or project to result in a LSE (either alone or in-combination with other plans or projects) on European sites must be carried out through the HRA process. Sites of Specific Scientific Interest (SSSIs) lie outwith the HRA process as they are not protected under the Habitats Regulations[3].

As the UK has exited the EU, the Habitats Regulations were amended in Scotland to allow for their continued application in Scotland's inshore and offshore waters. European sites within the UK now constitute the UK's National Site Network rather than being within the Natura 2000 network. The policies and procedures under the HRA Regulations remain unchanged (Scottish Government, 2020).

The procedural requirements to undertake HRAs for assessing potential effects on European sites are contained in the Habitats Regulations. The objectives in relation to the UK National Site Network include:

- To maintain or restore habitats and species listed in the Habitats Directive to favourable conservation status; and
- To 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] The Scottish Government recently updated is policy on protecting Ramsar sites, with the updated policy guidance available at https://www.gov.scot/publications/updated-scottish-government-policy-protecting-ramsar-sites/
[3] SSSIs will be assessed within the EIAR

2.2 HRA Process

Scotland enacts a staged process for the assessment of plans or projects under the Habitats Regulations, with guidance provided by NatureScot available through the HRA website[4]. There are nine stages under the Scottish HRA process, as summarised below:

- Stage 1. What is the plan or project?
- Stage 2. Is the plan or project directly connected with or necessary to site management for nature conservation?
- Stage 3. Is the plan or project (either alone or in combination with other plans or projects) likely to have a significant effect on a European site?
- Stage 4. Undertake an appropriate assessment of the implications for the site in view of its conservation objectives.
- Stage 5. Can it be ascertained that the proposal will not adversely affect the integrity of the site?
- Stage 6. Are there alternative solutions?
- Stage 7. Would a priority habitat or species be adversely affected?
- Stages 8 and 9. Are there imperative reasons of overriding public interest (IROPI)?

Stages 1 to 3 are addressed within this HRA Screening Report, while Stage 4 and 5 entail an appropriate assessment and will be reported within the RIAA. If it cannot be ascertained that the Project will not adversely affect the integrity of a European site, then Stages 6 to 9 will be implemented accordingly.

2.2.1 HRA Screening (Stages 1 to 3)

HRA Screening aims to identify aspects of the Project for which it is not possible to exclude LSE on a European site, either alone or in combination with other projects.

2.2.2 HRA Appropriate Assessment (AA) (Stages 4 and 5)

Where HRA screening cannot exclude potential LSE, a European site and relevant features are progressed to an AA. A RIAA is provided by a project, considering the effects of the project, alone and in-combination with other plans and projects, on the integrity of a designated site. The assessment is conducted with regard to the European site's Conservation Objectives. The RIAA is used to inform the Competent Authority AA on the implications for a European site considering the site's Conservation Objectives. This is required before the Competent Authority undertakes or gives any consent, permission, or other authorisation for, a plan or project. An AA may extend to plans or projects out with the boundary of a European site to assess the implications of the plans or projects on the features for which the site is designated.

[4] *Information on the staged process for completing a HRA is available on the NatureScot maintained sites at https://www.nature.scot/professional-advice/planning-and-development/environmental-assessment/habitats-regulations-appraisal-hra, which is correct as of May 2025*

2.2.3 Assessment of Alternative Solutions (Stage 6 and 7)

If the Competent Authority cannot reach a conclusion that there will be no adverse effect on the integrity of a European site, then the derogation process can be followed to determine whether it can progress. Alternative solutions are evaluated. This may include, for example, modifications to the design or location of a project.

2.2.4 Assessment of Imperative Reasons of Overriding Public Interest (IROPI) (Stages 8 and 9)

if the Competent Authority cannot conclude no adverse effect on the integrity of a European site, and no alternative solutions exists for the plan or project, a development may only proceed by satisfying the principles of IROPI, relating to human health, public safety or beneficial consequences of primary importance to the environment, or any other reasons, provided that the Competent Authority has had regard to the opinion of the Scottish Ministers in satisfying itself that there are such reasons. Where the principles of IROPI are satisfied, compensatory measures must be put in place to maintain the coherence of the UK National Site Network and offset the adverse effects caused to the European site.

2.2.5 Mitigation

Following the outcome of the European Court of Justice in the People Over Wind and Sweetman case in 2018 (Case C323/17), which was further refined in rulings by the same Court in June 2023, NatureScot provided guidance on the consideration of mitigation in the HRA process, by way of an interpretation of the People over Wind judgement. Advice relating to the consideration of mitigation within the HRA process is published and maintained on the NatureScot website[5].

NatureScot guidance outlines that mitigation measures intended to avoid or reduce harmful effects to a European site cannot be considered at the screening stage. Embedded mitigation measures which are not specifically designed to avoid or reduce effects on a European site, but do so incidentally, can be considered. As such, this HRA Screening Report does not consider mitigation measures that are specifically implemented to reduce or avoid effects on a European site but does consider mitigation measures which are not specifically designed in relation to effects on European sites, for example Shipboard Oil Pollution Emergency Plans.

2.3 Guidance

Documents guiding the HRA process for offshore developments in Scotland include:

- Habitats Regulations Appraisal: Guidance for Plan-making Bodies in Scotland (Tyldesley and Associates, 2015);
- NatureScot guidance on the HRA Process [2];

[5] *The NatureScot guidance following the People over Wind judgement is available at https://www.nature.scot/doc/naturescot-guidance-note-handling-mitigation-habitats-regulations-appraisal-people-over-wind-cjeu, with the provided information correct as of May 2025.*

- MD-LOT guidance: Information on Habitats Regulations Appraisal (HRA) that should be considered for marine licensing and consenting[6].
- The handling of mitigation in Habitats Regulations Appraisal – the People Over Wind CJEU judgement [3]; and
- EU Exit: habitats regulations in Scotland (Scottish Government, 2020).

This HRA Screening Report has utilised the above-mentioned documents.

[6] *https://www.gov.scot/publications/marine-licensing-and-consenting-habitats-regulations-appraisal/*

3 PROJECT DESCRIPTION

3.1 Overview

The Project involves the installation, operation and decommissioning of up to 70 Orbital O2-X style floating tidal turbine devices at the Westray Firth, Orkney, with a total generating capacity of 170 MW. Station-keeping for each device would be via four mooring lines connected to either rock drilled or gravity anchors. There would be four anchors per device, or anchor sharing if deemed technically achievable following detailed design.

There would be up to five 33 kV electrical export cables, exporting through the EMEC Fall of Warness tidal demonstration site and make cable landfall and grid connection at onshore connection point within the confines of the EMEC facility. As such, this HRA Screening report and subsequent HRA RIAA that supports the offshore consents applications solely pertains to the offshore elements of the Project within Westray Tidal Array area and export cable between the Project array and EMEC Fall of Warness tidal demonstration site, as electricity export from the Project, will be through the adjacent EMEC Fall of Warness export cables and connected to the National Grid at the EMEC facility on Eday. Any new onshore infrastructure (at the EMEC site) will be applied for as a separate planning application under the Town and Country Planning (Scotland) Act 1997.

The Project is targeting a CfD application in 2027. To achieve this, the Project will need all required onshore and offshore consents, as well as a grid connection. Pending successful CfD award, a final investment decision is to be completed by 2029, with installation to take place from 2031. The Project would operate for up to 25 years with decommissioning around 2056.

3.2 Project Design Envelope (PDE)

A PDE is developed for the Westray Project to describe the worst-case scenarios and provide a scope to inform this HRA Screening Report.

3.2.1 Infrastructure Overview

It is anticipated that the Project will include the following:

- Up to 70 O2-X devices, which are floating at the sea surface;
- Inter-array / umbilical cables between devices;
- Up to five export cables from the O2-X devices at Westray to the EMEC transmission infrastructure; and
- Navigation markers as required, subject to the conclusions of a Navigational Risk Assessment (NRA) and consultation with the MCA and Northern Lighthouse Board (NLB).

The final layout of O2-X devices and associated cabling and navigation markers will be determined post-consent. However, a minimum separation of 130 m is to be applied between devices at the surface (i.e. between rotor tips and superstructure extents) during operation, while anchors may be shared between devices, with no separation at the seabed. Potential layout options will be considered within the stated minimum separation in order to inform the impact assessment.

3.2.1.1 O2-X Device and Cabling

The O2-X is a floating tidal stream energy generator with a cylindrical floating steel superstructure, which houses power conversion and auxiliary systems.

Station keeping is provided to the superstructure via a multi-anchor catenary mooring system consisting of rope tethers, mooring chain and anchors, described further in Section 3.2.1.2.

Power is exported from the turbine via a dynamic cable from the superstructure to the seabed where it connects to seabed static cabling infrastructure that exports power ashore to the EMEC substation. The O2-X device is rated to operate between flow speeds of 1 m/s and 5 m/s, which covers the range in flow speeds through this region of the Westray Firth for a large proportion of the tidal cycle. The O2-X device, will therefore be operational for up to 75% of the flood-ebb tidal cycle.

Table 3-1, Figure 3-1 and Figure 3-2 outline the indicative device parameters. Figure 3-3 and Figure 3-4 respectively show the O2-X device in operation and maintenance mode with the rotors raised. Further properties related to the O2-X device that have been used to inform this HRA Screening Assessment are presented in Table 3-1.

Table 3-1 Indicative Device Parameters

PARAMETER	INDICATIVE VALUE
Maximum number of tidal turbine devices	70
Number of rotors per device	2
Maximum rotor diameter	26 m
Maximum number of rotor blades per device	4 (2 blades per rotor)
Maximum rotation speed	12 rpm
Maximum rotor swept area	534 m^2 per rotor (1068 m^2 per device)
Rated power per device	c. 2.4 MW
Rated current speed	2.5 m/s
Cut-in current speed	1 m/s
Shut down current speed	5 m/s
Maximum hull length	88 m
Maximum height above water	1.6 m
Depth to uppermost rotor tip during operation (rotors extended)	3.2 m
Maximum depth to bottom rotor tip (deepest point) during operation (rotors extended)	34 m
Floating structure diameters	4 m
Design life	25 years
Maximum number of mooring lines per device	4
Maximum mooring line length (each)	225 m

PARAMETER	INDICATIVE VALUE
Maximum mooring spread	420 m x 220 m
Maximum number of anchors per device	4 (one per mooring line)
Minimum spacing between devices at the sea surface	130 m
Minimum separation distance between device anchors and mooring at the seabed	0 m (devices could share anchors)

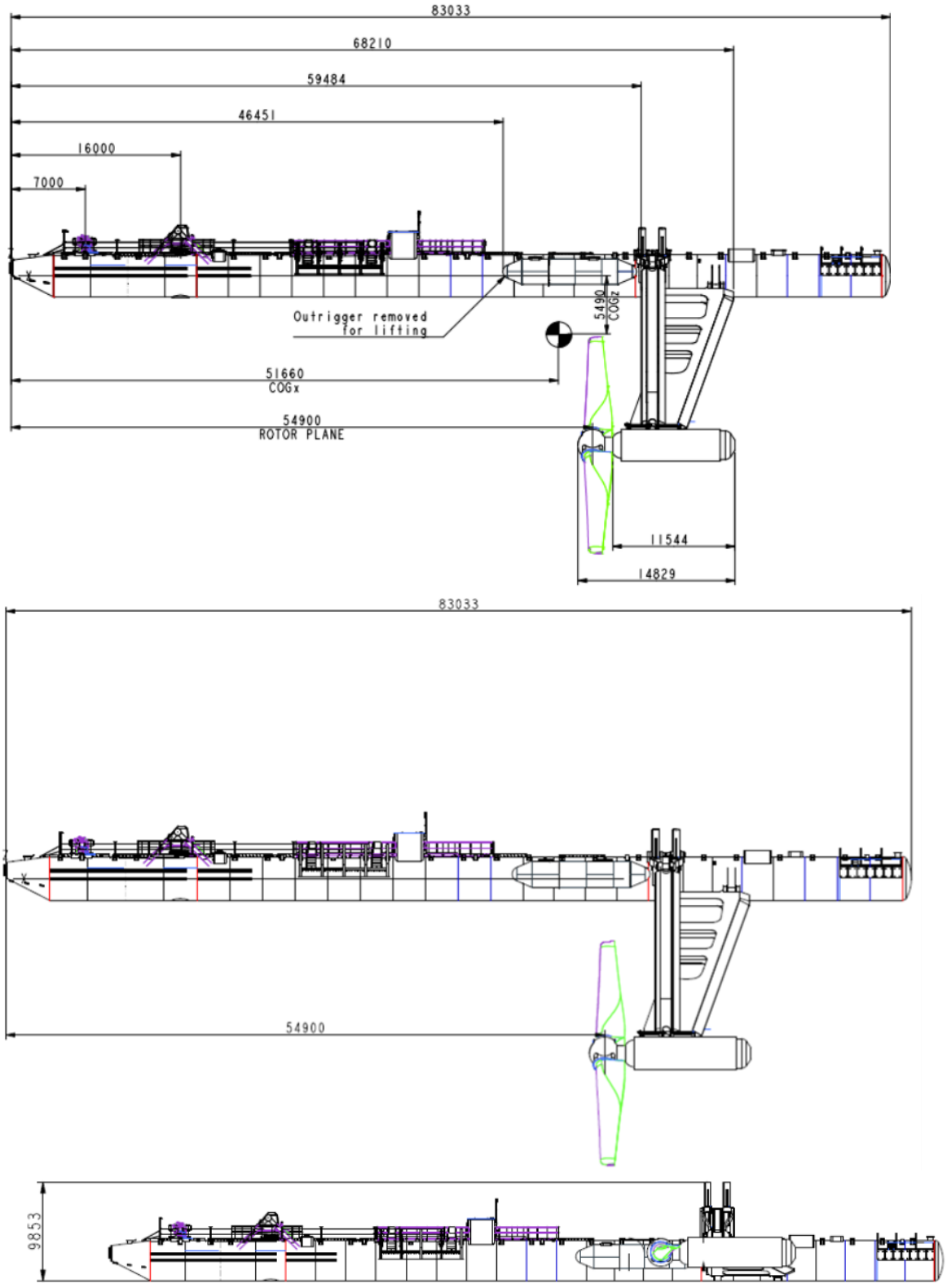

Figure 3-1 Indicative device parameters (side views)

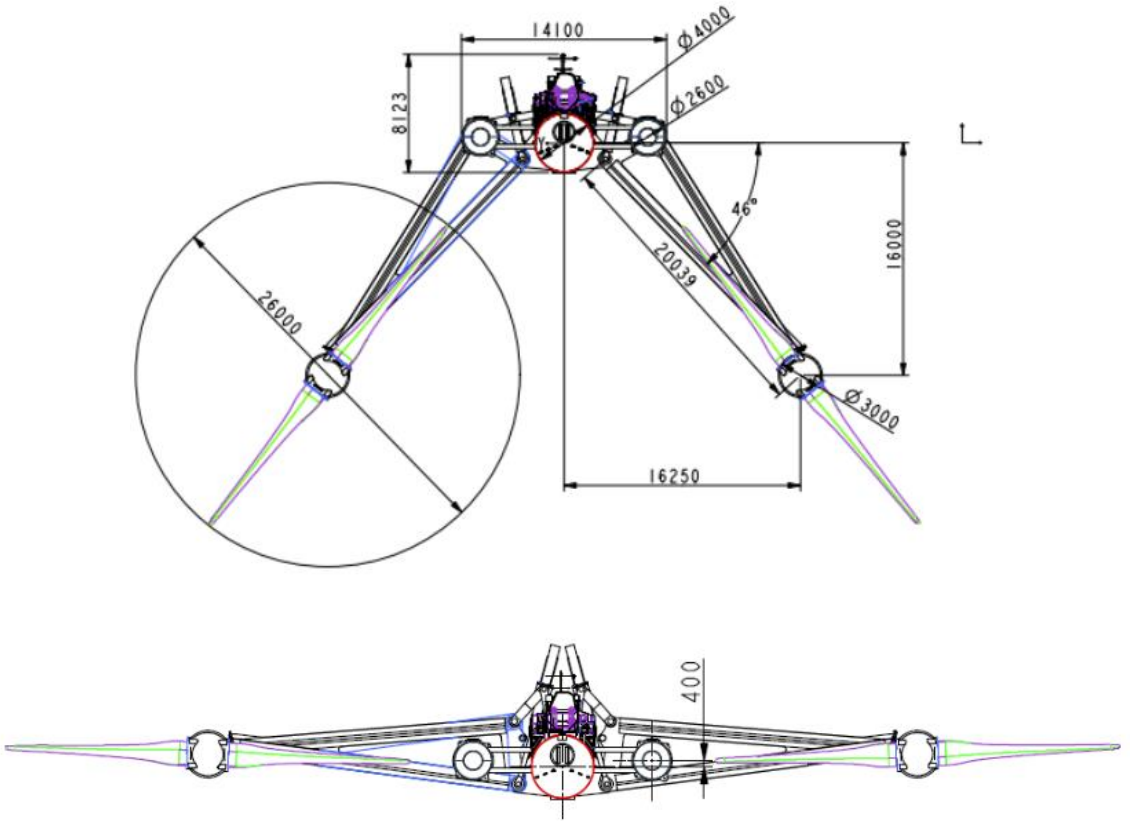

Figure 3-2 Indicative device parameters (front view with and without legs raised for maintenance

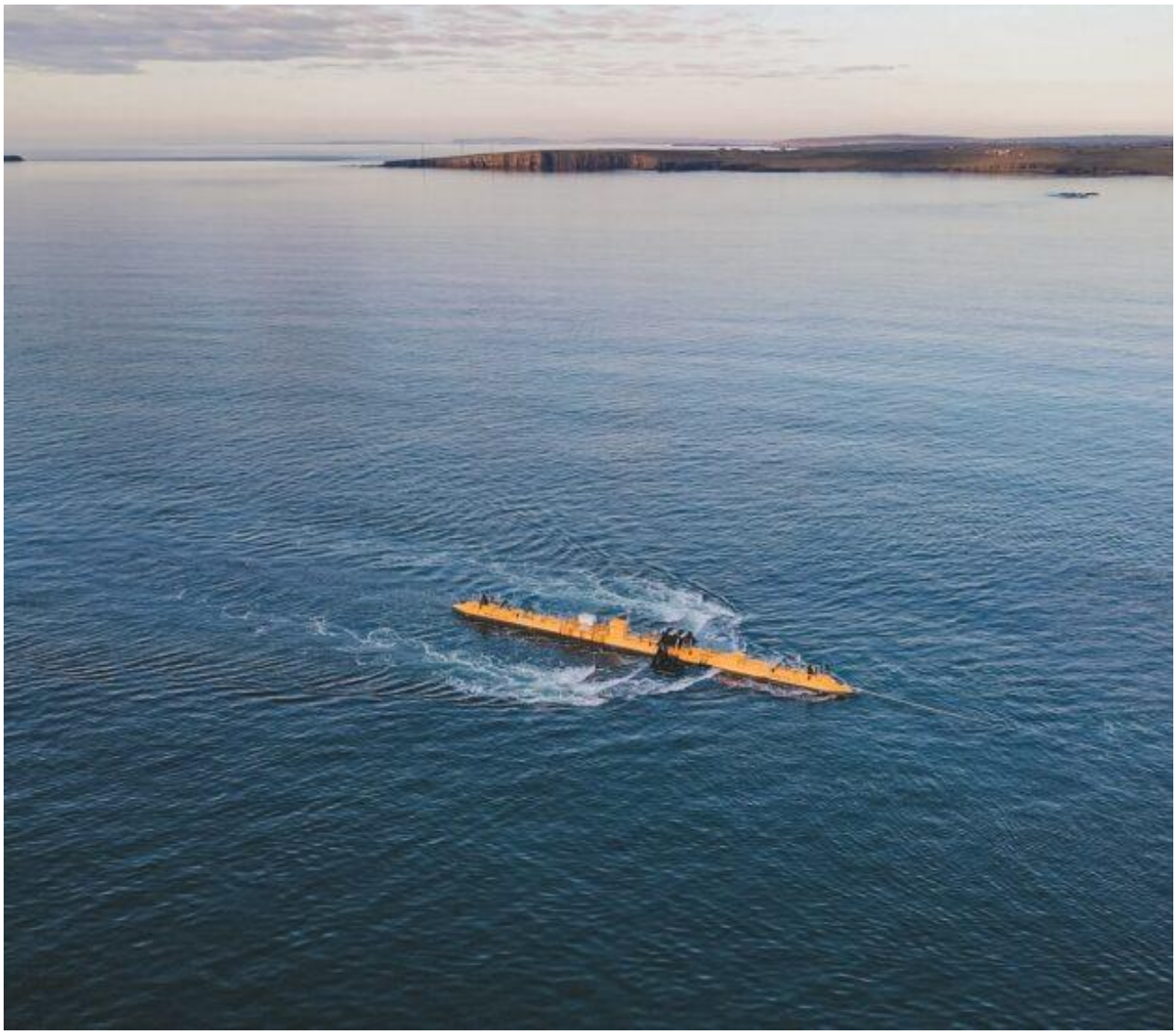

Figure 3-3 O2-X in operation

Figure 3-4 O2-X (previous device iteration in maintenance mode with rotors raised

3.2.1.2 Mooring and Anchoring System

The O2-X devices will be secured to the seabed with up to four catenary mooring lines and anchors. Mooring lines may be studlink chain (c. 100 mm diameter) with synthetic rope in the upper sections (c. 170 mm diameter). An image of the indicative anchor spread is shown in Figure 3-5.

The device will be secured to the seabed using gravity and/or rockbolt anchors, subject to the ground conditions. It is possible that both options could be used across the Project area. Up to four anchors will be used per device, with a total of up to 280 anchors for the Project. Estimates of properties for each anchor type are as follows, although this is still subject to refinement during detailed design:

- Gravity anchors comprise ballast of c. 11 m x 11 m x 2.5 m each. Equating to an estimated footprint of 121 m^2 per anchor and 484 m^2 per device; and
- Rockbolt anchors use steel vertical bolts drilled into the seabed. The rockbolt anchors would be up to c. 10 m in length, with c 1 m protruding the seabed, and c. 0.6 m in diameter each. Equating to an estimated footprint of 0.28 m^2 per anchor and 1.1 m^2 per device.

There is the potential for O2-X devices to share anchors to minimise cost and seabed footprint.

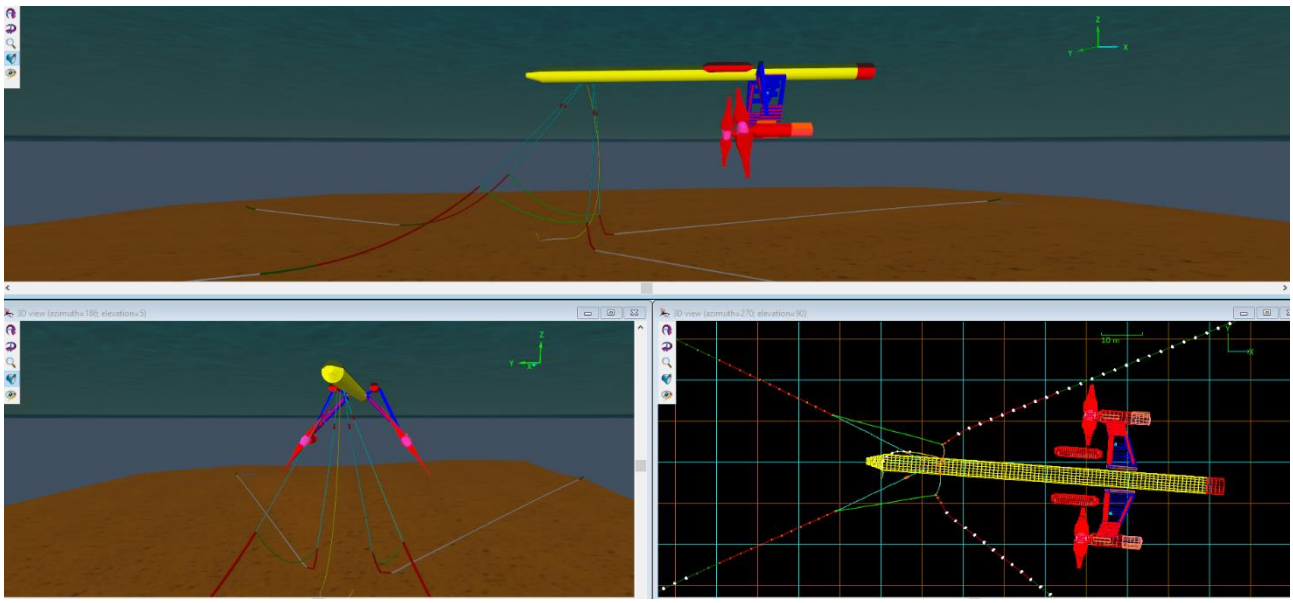

Figure 3-5 Indicative anchoring diagram

3.2.1.3 Scour Protection

Concrete mattresses or rock aggregate bags will be placed around each anchor to prevent scour, where required. The seabed footprint of scour protection would be c. 145 m^2 per anchor and 580 m^2 per device. The height of scour protection above the seabed would be c. 0.3 m.

3.2.2 Installation of Tidal Devices

The O2-X devices will be constructed onshore and towed to the Project array area for installation.

3.2.2.1 Anchor Installation

Prior to the installation of the devices, the site will be surveyed using a Remotely Operated Vehicle (ROV) to support micro-siting, and sonar and Acoustic Doppler Current Profiler (ADCP) measurements of the tidal currents at the site will also be collected to inform installation. Grab sampling of the seabed and core sampling will be undertaken to assess the suitability of the seabed for the anchoring technology.

Installation will depend on the type of anchors used, gravity anchors or rockbolts. If gravity anchors are utilised, they will comprise modular heavy ballast sections assembled into single holding structures located on the seabed. Each seabed structure or 'basket' would have the required volume to accept the total mass of ballast material in modular format. The anchor basket will be pre-installed and made ready to accept ballast. A length of chain pre-connected will be deployed along with the anchor basket so that it is recoverable to the surface, this chain will form the first section of the chain based catenary mooring system. The second section of mooring chain forming the main catenary will connect into the pre-installed first section on the deck of a work vessel on site. The completed mooring line will then be terminated with a mooring connector system which interfaces with the floating turbine.

If rock bolts are installed, a submersible and remotely operated drill rig will be deployed from a multi-cat vessel or similar inshore construction vessel. It will be operated by a hydraulic power unit (HPU) which will remain on the deck of the vessel during the operation. The drill rig will embed the rock anchor in the seabed; drilling time per anchor will be approximately 6-hours. The anchors will be positioned using a Global Navigation Satellite System (GNSS) system, a heading sensor and cameras installed on the drilling rig. After the installation of each anchor, the drill rig will be recovered before the support vessel's position is changed, using a pre-laid arrangement of moorings.

3.2.2.2 Cable Installation

The cable installation process for the subsea array of floating O2-X devices will involve the following steps:

- Cable Route Survey: Prior to installation, a thorough geophysical survey will be conducted using ROV, sonar, and ADCP measurements to assess the cable route. This survey will help identify potential obstacles, seafloor conditions, and any sensitive habitats along the route;
- Cable Preparations: The subsea power cables will be prepared onshore, including the termination of connectors and the installation of necessary protection measures such as armour or insulation, depending on the cable specifications and environmental requirements;
- Cable Lay Vessel: A specialized cable lay vessel will be employed for the installation process. This vessel will have the capacity to transport and deploy the cables while maintaining control and stability in tidal streams;
- Cable Installation: The cable lay vessel will deploy the subsea power cables along the predetermined route using suitable cable laying techniques. These techniques may include ploughing, jetting, rock-cutting or other methods that minimize seafloor disturbance and protect the cable during installation;
- Cable Connection: At the turbine location, the cable end will be lifted, and any temporary keep weights will be removed. The cable end will then be passed over to the turbine structure for connection. The turbine will be equipped with appropriate equipment and mechanisms to secure and connect the cable, ensuring a reliable and efficient electrical connection;
- Cable Testing and Protection: After the cable is connected, testing procedures will be conducted to verify the integrity and functionality of the installed cable. Any necessary repairs or adjustments will be made to ensure optimal performance. Additionally, appropriate protection measures, such as burial or covering, will be implemented to safeguard the cable against external factors and potential damage; and
- Post-Lay Survey: Following the cable installation, post-installation monitoring will be carried out to assess the effectiveness of the installation process and identify any potential long-term impacts on the marine environment. This monitoring will help inform future maintenance and mitigation efforts.

3.2.2.3 O2-X Device Installation

The installation of the O2-X devices will involve towage of device and connection to moorings. These works require a vessel that has capacity to carefully move the turbine from the onshore holding location, tow the turbine to the installation site and maintain control of the turbine in tidal stream during connection.

The connection operation will take place over a neap tidal cycle (two slack periods) using the winching systems installed on the turbine to recover the catenary based mooring system and latch into the connection points installed on the terminal end of the synthetic risers. Once latched and locked into position the turbine will recover the dynamic riser section of cable for installation using the same winching process.

The cable end will be lifted and any temporary keep weights must be removed before passing over cable end to the turbine structure. Following connection of the turbine mechanically, the towing vessel will remove towing equipment and prepare the cable for installation. The turbine will then recover the cable into the turbine and connect to the electrical grid.

During all the installation activities an additional vessel for safety as well as line running and connecting mooring lines is required. This is expected to be a RHIB vessel selected with due consideration of the task required and area of operation. Methods for anchoring the devices are discussed in Section 3.2.1.2.

3.2.3 Cables and Cable Protection

The inter-array and export (to the EMEC tidal demonstration site) cables will employ subsea power cables, which are equipped with armour and protective layers, typically made of steel or other robust materials. These layers enhance the cables' resistance to abrasion, impact, and external pressures, providing an additional level of protection.

The Project cables may be buried using methods as introduced in Section 3.2.2.2, or may be surface laid with rock pins used to keep the cable pinned to the seabed. Approximate lengths of cables are as follows:

- Up to 33 kV "daisy chains", with a maximum of 15 dynamic inter-array cables connecting each O2-X device to the main 33 kV export cable. Each cable could have a maximum length of 500 m; and
- Up to five export cables comprising 33 kV, cables with a maximum length of 5 km each within the Westray Project. An additional 5 km length may extend between the Westray Project and the EMEC transmission infrastructure, however this is not part of the Westray Project envelope and is to be consented in relation to the ongoing EMEC Fall of Warness Section 36 application.

3.2.4 Installation Programme

The full installation is expected to take 60-months, with the installation likely to commence in the early 2030's. The total installation programme will be dependent upon how the Project secures CfD or alternative revenue stream arrangements.

3.2.5 Operation and Maintenance

The operation of the devices will be monitored and controlled remotely via a Supervisory Control and Data Acquisition (SCADA) system which will run permanently on a dedicated computer located at an onshore location.

The O2-X device is fundamentally designed for ease of access and maintenance. As a floating device, scheduled and unscheduled maintenance operations on electrical, control and hydraulic systems can be carried out onboard the device simply by transferring personnel from a small vessel such as a RIB onto the hull of the devices. From here personnel can enter the hull and access the majority of equipment. This is anticipated to be conducted several times a year.

For more significant maintenance operations or where weather conditions preclude a personnel transfer a device can be disconnected from its mooring and towed to a maintenance location. Once disconnected from its moorings, the rotor legs are retracted, and the low transport draught of the turbine allows the use of local shallow bays / pontoon facilities for maintenance. This is anticipated to be conducted once, maximum twice, per Project lifetime. The Project will be operational for up to 25 years.

3.2.6 Decommissioning

The Offshore Renewable Energy Decommissioning Guidance states that "an indication of the decommissioning proposals should be included as part of the statutory consenting or licensing process so that the feasibility of removing the infrastructure can be assessed as part of the application process" (Scottish Government, 2022).

The HRA Screening will therefore include an assessment of the expected decommissioning works at the end of the Project life (expected to be 25 years). It is likely that these will be largely a reverse of the construction processes, with potential for cable protection and scour protection to be left in situ where they have become colonised, subject to navigational safety. The decommissioning works will be subject to further environmental assessment prior to the time of decommissioning.

Decommissioning methods may change by the time the Project is decommissioning, but it is envisaged that it would comprise the following activities:

- The electrical connections for the devices will be unlocked and capped, weighted and returned to the seabed;
- The mooring connections fore and aft of the floating platforms will be un-locked from the devices and returned to the neutral buoyancy position marked with the approved pick-up buoy;
- The devices will be towed off-site using a multicat vessel and taken to an appropriate harbour or sheltered bay location for temporary mooring;
- Each of the mooring shackles connecting the mooring lines to the mooring connectors will then be released and returned to the seabed with navigation/pick-up buoys attached to enable recovery;
- If gravity anchors are utilised, each of the anchor cages and ballasts will then be recovered including the mooring lines;
- If rockbolt anchors are utilised, the mooring lines will be recovered and the anchors themselves will be left in situ in the seabed to minimise the environmental impact associated with the decommissioning phase, with the

exception of the extent of rockbolt element protruding from the seabed, which will be cut-off at the seabed. If rockbolt anchors that are fully removable become available, they will be considered for use and the decommissioning methodology updated accordingly;
- Rock bags or concrete mattresses will be recovered with a multi-cat style work vessel using a hydraulic actuated grab and subsea mounted 360 degree camera; and
- Cabling and any other remaining seabed infrastructure such as cable junction boxes would be removed unless there were overriding reasons why it would be preferred for environmental impact reasons to leave some sections in situ.

3.3 Embedded Mitigation

A number of designed-in measures are being implemented to reduce the potential for impacts to the environment across the receptor topics. Although the designed-in measures have been identified for the Westray Project, no mitigation measures are used to assess the potential for LSE on a European or Ramsar Site's integrity. Instead, these are summarised here to demonstrate Orbital's ongoing commitment to limiting environmental impact, as well as the varying responsibilities for implementing the measures. Furthermore, it should be noted that Orbital have been deploying grid connected O2-X tidal device within the EMEC Fall of Warnes tidal demonstration sites over the past 10 years, with a number of these mitigation and monitoring measures already being implemented, in line with environmental regulations and best practice. No negative environmental impacts have been seen to date over these periods of operation.

- Pollution Mitigation: The UK is also a signatory to the International Convention for the Prevention of Pollution from Ships (the MARPOL Convention 73/78) and all ships flagged under signatory countries are subject to its requirements, regardless of where they sail. The convention includes regulations aimed at preventing and minimising pollution from ships, both accidental and that arising from routine operations. All work practices and vessels associated with the Project will adhere to the requirements of the MARPOL convention; specifically Annex 1 Regulations for the prevention of pollution by oil concerning machine waters, bilge waters and deck drainage and Annex IV Regulations for the prevention of pollution by sewage from ships concerning black and grey waters. Oils and lubricants used in the O2-X device will be biodegradable where possible and all chemicals would be certified to the relevant standard.
- Management Plans: A series of management plans are to be completed and submitted as part of the Project consent application, with the following management plans being developed at a minimum:
  - Construction Environmental Management Plan (CEMP);
  - Operation Environmental Management Plan (OEMP);
  - Offshore Construction Method Statement (CMS);
  - Cable Plan;
  - Vessel Management Plan (VMP);
  - Marine Pollution Contingency Plan (MPCP);
  - Marine Biosecurity Plan;
  - Environmental Clerk of Works (ECoW); and
  - Lighting and Marking Plan (LMP)
- Co-operation with EMEC: Westray is adjacent to the EMEC Fall of Warness tidal demonstration site and the two projects have entered into a co-operation agreement to share information and transmission infrastructure in order to minimise impacts on the physical, biological and human environment. This is further evidenced through the

joint marine wildlife survey for ornithology and marine mammals, which has been consulted on with NatureScot (Section 4.2).

4 SCREENING METHODOLOGY

4.1 Screening Process

4.1.1 Overview

This section outlines the HRA screening process which follows a stepwise approach that has been used consistently for all receptor specific topic assessments respectively:

- Section 5 – Annex I habitats;
- Section 6 – Marine mammal features (including cetaceans, pinnipeds and Eurasian otter); and
- Section 7 – Ornithology features.

4.1.2 Identification of European Sites and Features with Connectivity

The Identification of European sites and features with connectivity to the Project is conducted with reference to the qualifying interests/ features. This is achieved via:

- Identification of the range of effects the Project could have on qualifying feature(s) of a site (pathways for LSE); and
- Determination of connectivity with a site (e.g., if a qualifying interest / feature of the European site may overlap with the Project boundary or wider Zone of Influence (ZoI).

Factors which affect connectivity include life cycle, foraging, breeding, and migration of a site's qualifying features as well as the characteristics and potential effects associated with the Project. The criteria used to determine connectivity are defined in each particular receptor topic. This step produces a list of European sites and features with connectivity to the Project.

4.1.3 Determination of LSE

In those cases where connectivity is identified between the Project and a site's qualifying interests, further appraisal determines whether potential LSE can be concluded due to the identified connectivity. To determine potential LSE it is necessary to:

- Determine whether that qualifying feature(s) would, due to its behavioural and foraging characteristics, be affected by a particular effect (species sensitivity); and
- Where a qualifying feature is likely to be affected by an effect, identify whether or not this is likely to have a significant effect on the conservation objectives for the site (conclusion of potential LSE or not).

The assessment of potential LSE uses data and information on effect pathways and characteristics of qualifying interests. This high-level appraisal assesses whether or not any of the site's conservation objectives may be

undermined due to the potential effects. No potential LSE is concluded if there is no potential for the conservation objective to be undermined.

4.2 Consideration of Diadromous Fish

'Diadromous' fish species spend a portion of their lifecycle in a freshwater environment and a portion of it in the marine environment. There are two categories of diadromous fish – catadromous and anadromous. Catadromous fish hatch or are born in the marine environment, but then migrate to freshwater environments where they spend most of their lives reaching maturity. Anadromous fish species are born in freshwater habitats but immediately swim to sea where they spend most of their lives, before returning to freshwater rivers to spawn.

By their nature, diadromous fish species are highly mobile and could foreseeably interact with the Project and the main potential impact pathways to such species associated with the Project are as follows:

- Installation and Decommissioning:
  - Underwater noise from foundation/mooring installation methods and vessels leading to auditory injury, death or disturbance.
- Operation and Maintenance:
  - Underwater noise from tidal devices operation;
  - Electromagnetic Field (EMF) effects;
  - Presence of tidal devices and associated infrastructure leading to a barrier effect; and
  - Collision with turbine blades leading to injury or death, in this respect relate to increases in suspended sediment concentration (SSC) during installation.

A range of contemporaneous regulatory advice regarding energy generation in the marine environment and associated transmission infrastructure to the coast have been reviewed to help inform this assessment, and to ensure the delivery of a high-quality proportionate document to MD-LOT and consultees. This includes advice provided to the Berwick Bank Wind Farm (BBWF) development (MD-LOT, 2023a), West of Orkney Offshore Wind Farm and – most recently – advice provided to the Cambois Connection Project (a HVDC cable development linked to the BBWF) (MD-LOT, 2023b). Based on this review, MD-LOT's current advice for comparable schemes notes the high degree of uncertainty related to diadromous fisheries:

'*Diadromous fish–- With regards to the qualifying features to be considered, MD-LOT advises that due to the current uncertainty on where the species of Atlantic salmon, sea and river lamprey go within marine waters, these should be screened out from the HRA and instead must be considered through the Environmental Impact Assessment Report for the Proposed Works in line with the NatureScot representation*'.

Although the advice relates to cable infrastructure and offshore wind developments, the advice is nonetheless considered to be applicable to the Project. The Project is located within the marine environment and has a relatively small footprint compared to the wider environment, with any resulting impacts expected to be localised and less extensive than those associated with aforementioned developments. .

On this basis and considering the very recent and clear NatureScot advice[7] regarding assessment of diadromous fisheries, they are not considered further within this assessment. In line with the advice, consideration of the potential for impacts to diadromous species will be completed within the EIAR for the Project.

4.3 Stakeholder Consultation

Stakeholder engagement is a key part of the HRA and EIA process. The aim of stakeholder engagement is to facilitate two-way communications about the Project with all relevant stakeholders. This allows any environmental concerns to be identified at an early stage and provides the opportunity for the Orbital to ensure that these concerns can be adequately addressed during the EIA process. Orbital has already undertaken extensive stakeholder engagement in relation to the Westray Tidal Array Site, considering issues relating to both the EIA and HRA. An overview of consultation to date directly in relation to the Project is presented in Table 4-1.

Feedback with respect to the Scoping Report (Orbital 2023) was also obtained from the consultees through the Scoping Opinion (MD-LOT, 2024), with consultee comments as relevant to this HRA Screening exercise being incorporated into this report. In particular, in addressing matters raised withing the Scoping Opinion, Orbital is completing a benthic survey across the Project area. In addition, following the guidance provided by NatureScot and Orkney Islands Council (OIC) in the Scoping Opinion, further sources of data for benthic habitats and species in the area have been considered (i.e. Thomson *et al.*, 2014; Pasco *et al.*, 2021; Shucksmith *et al.*, 2021). Furthermore, following guidance provided by OIC in the Scoping Opinion the Project has been in contact with the International Centre for Island Technology (ICIT), Stromness, exploring the availability of data around benthic habitats and species; the data available, however, were not site-specific and thus their usage would be very limited.

Orbital along with EMEC have completed marine wildlife surveys across the Westray Firth, covering the extents of both Projects between April 2023 and March 2025. The survey comprised ornithological European Seabirds At Sea (ESAS) and Marine Mammal Observation (MMO) surveys, with purpose of the surveys to provide information and a baseline to inform both the EIA and HRA for both the Orbital Westray and EMEC Fall of Warness Projects. Extensive consultation has been completed in relation to marine wildlife surveys, which are directly relevant to the ornithology and marine mammal receptor topic assessments presented within this HRA Screening Report. A summary of the completed consultation with respect to the surveys is presented in Table 4-2.

Table 4-1 Project specific consultation completed to date

CONSULTEE	DESCRIPTION	CONSULTATION DATE
MD-LOT	Email correspondence with MD-LOT team clarifying the process for scoping and duration that feedback is valid for.	18th April 2023

[7] *The NatureScot guidance following the People over Wind judgement is available at https://www.nature.scot/doc/naturescot-guidance-note-handling-mitigation-habitats-regulations-appraisal-people-over-wind-cjeu, with the provided information correct as of May 2025.*

CONSULTEE	DESCRIPTION	CONSULTATION DATE
	Teams meeting with MD-LOT to outline Orbital development plans in Orkney, including the Westray Tidal Array, along with associated proposed timeframes.	22nd June 2023
	Teams meeting with MD-LOT team to update on progress the Westray Tidal Array and other Orkney based projects. Reference was made to surveys being conducted to date.	16th November 2022
MCA, NLB and Chamber of Shipping	A follow-up stakeholder update meeting with shipping and navigation stakeholders.	20th October 2023
Orkney Ferries	Face-to-face consultation meeting in Orkney to discuss the potential impacts on ferry routes. This discussion was supported by NASH Maritime and the proposed project boundary was altered to account for ferry routes to and from Westray.	25th April 2023
Shipping and Navigation stakeholders	The shipping and navigation stakeholders included: Orkney Ferries, Maritime Coastguard Agency (MCA), Northern Lighthouse Board (NLB), Royal Yachting Association (RYA) Scotland, Orkney Ferries, RNLI, Orkney Marinas, Orkney Fisheries and, Orkney Harbours. A Microsoft Teams stakeholder workshop was held to introduce the proposed Project.	27th March 2023
Orkney Islands Council	In person meeting with Orkney Islands Council (OIC) members at OIC offices. Attended by 20+ members. Orbital presented the Project, approach to data collection and development, inclusive of positive local socio economic impacts of the Project. Discussion from OIC members focused on OIC encouraging the Project to progress.	7th November 2022

Table 4-2 Consultation completed with NatureScot in relation to the Westray marine wildlife surveys

CONSULTATION	DESCRIPTION OF ENGAGEMENT	DATE
Survey strategy	Submission of the marine wildlife survey strategy for a collaborative survey approach between Orbital and EMEC, covering the Westray and Fall of Warness projects respectively. Survey strategy was submitted to NatureScot and MD-LOT. On 16th February 2023 A response was received from NatureScot on 13th April 2023, providing some comments and further questions relating to the submitted survey strategy.	February – Marc 2023
Year 1 breeding surveys	Survey update report on the Year 1 breeding surveys (i.e. April – August 2023) was submitted on 5th October 2023 and an associated consultation meeting held on 17th October 2023. Meeting minutes were shared with NatureScot, with comments provided and approved.	October 2023

CONSULTATION	DESCRIPTION OF ENGAGEMENT	DATE
Year 1 non-breeding surveys	Survey update report on the Year 1 non-breeding surveys (i.e. October 2023 – January 2024) was submitted on 26th January 2024. A written response was received from NatureScot on 1st March 2024, necessitating additional detail was required to inform the necessary assessments for the EIA and HRA and clarifying further and ongoing surveys (up to two-years) would be required. As a result of the comments received in the written response a consultation meeting was held providing additional information and detail as raised in the response, and an associated consultation meeting held on 8th May 2024.	January and March 2024
Year 2 surveys	No specific consultation meeting has been held in relation to the surveys completed in year 2. Instead a brief update was provided to MD-LOT and NatureScot during the EMEC Fall of Warness Project update meeting on 13th March 2025, where a summary of the full 2-year survey effort was provided. A summary of results for the marine mammal surveys was provided, Comments were received from NatureScot pertaining to the completed surveys in the advice dated 2nd May 2025.	March and April 2025
All survey results and statistical analyses method	A report providing summary results of the full two-year marine wildlife (i.e. marine mammal and bird) surveys and the proposed statistical analyses methods in line with requests from NatureScot.	June 2025

5 EUROPEAN SITES DESIGNATED FOR ANNEX I HABITATS

5.1 Initial Screening Criteria

The initial screening criteria applied to identify European sites with relevant Annex I habitats (including Ramsar Sites/Sites of Special Scientific Interest (SSSIs)) are:

- The Project boundary overlaps with European sites designated for Annex I habitats; and
- The European site designated for Annex I habitats is located within a Zone of Influence (ZoI) of 25 km from the Project boundary. The buffer zone size (i.e. 25 km) has been selected on the basis that the majority of sediment mobilised due to the Project activities is expected to remain within this area, however, the 25 km is representative of the expected maximum tidal excursion extent as informed by the Scoping Report (Orbital, 2023). The buffer zone is expected to encapsulate any in-combination effects on the benthic environment in conjunction with third party activities.

5.2 Identification of Sites and Features with Connectivity

There is one Special Area of Conservation (SAC) and one SSSI which include benthic habitats as qualifying features, within the Project ZoI, as shown in Figure 5-1 and listed in Table 5-1. Given that the boundary of these European sites overlap the Project ZoI but not the Project boundary, the potential pathways for LSE on these European sites are discussed further in Section 5.3.

Table 5-1 Summary of the European sites designated for Annex I habitats with potential connectivity to the Project area

SITE NAME	QUALIFYING INTEREST / FEATURES	DISTANCE TO PROJECT (KM)
Sanday SAC	• Reefs; • Sandbanks which are slightly covered by seawater all the time; and • Mudflats and sandflats not covered by seawater at low tide.	13.7
East Sanday Coast SSSI	• Rocky shore; and • Sandflats.	15.6

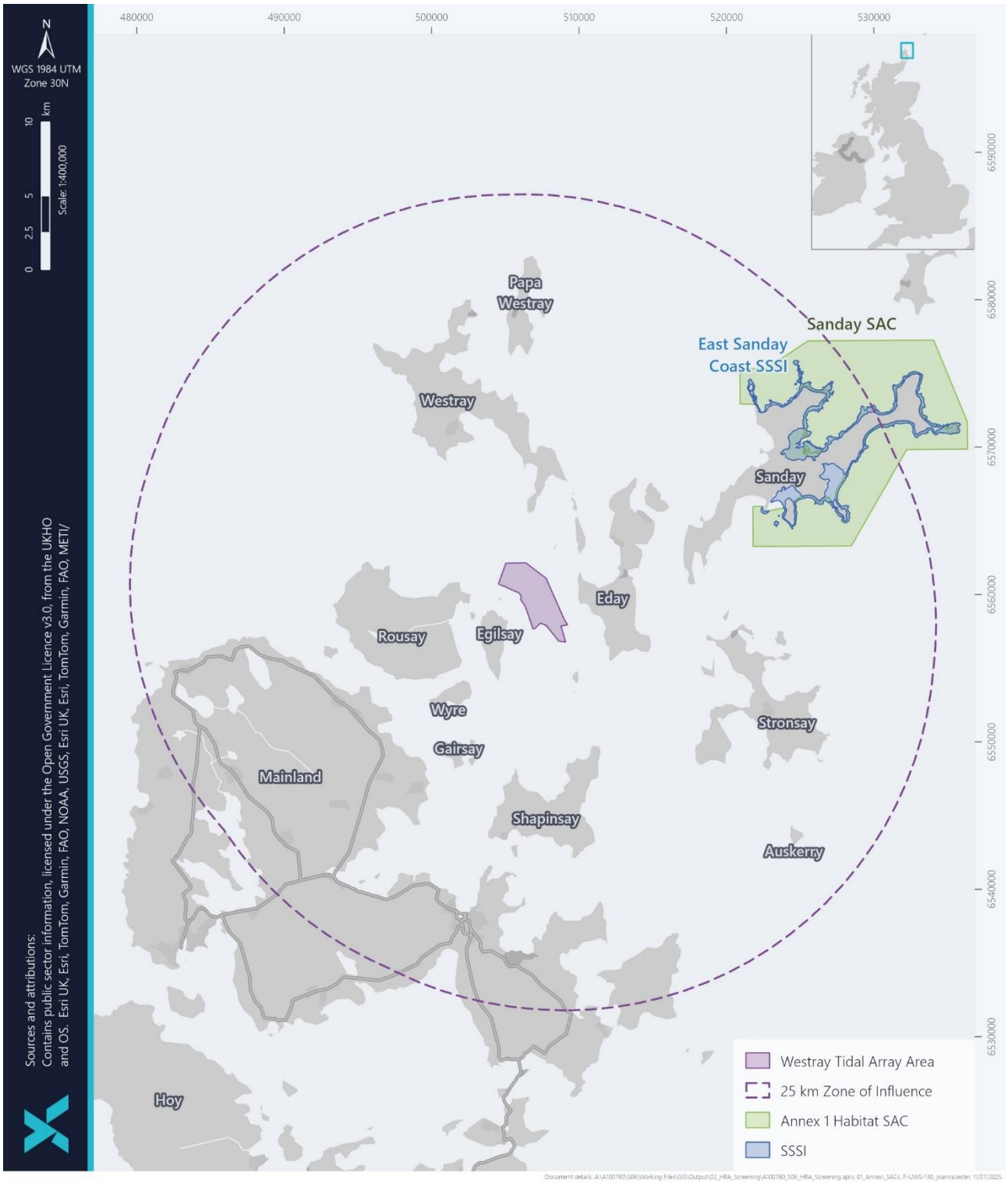

Figure 5-1 - Location of European sites designated for Annex I habitats within the 25 km ZoI

5.3 Determination of Potential LSE

Only impacts scoped into the EIA are considered below. The Scoping Opinion (MD-LOT, 2024) agreed that the impact '*Increased suspended sediment and turbidity from installation of subsea infrastructure, including cable laying, leading to smothering of benthic species*', should be scoped out for all Project phases, and as such is not considered further in this HRA Screening Report. Therefore, the potential pathways to LSE that have been considered in relation to Annex I Habitats are as follows:

- Construction and Decommissioning:
  - Substratum / habitat loss / damage from placement of devices and other infrastructure on the seabed, cable laying;
  - Colonisation of hard infrastructure; and
  - Introduction of marine Invasive Non Native Species (MINNS).
- Operation
  - Substratum / habitat loss / damage from placement of devices and other infrastructure on the seabed, cable laying;
  - Changes to hydrodynamic regime leading to change in benthic habitat;
  - Colonisation of hard infrastructure;
  - Introduction of Marine Invasive Non Native Species (MINNS); and
  - Impact to benthic communities from Electromagnetic Field (EMF) or thermal load from export and inter-array cables.

The Natura Casework Guidance on 'How to consider plans and projects affecting SACs and SPAs (NatureScot, 2014) state that in all cases, effects are likely to be significant and indicate an obvious need for appropriate assessment where an effect will:

1. Cause a reduction in the area of habitat or of the site;
2. Cause a direct of indirect change to the physical quality of a site or the habitats within a site; and/or
3. Cause an ongoing disturbance to a qualifying species or habitats.

There are two European sites that meets the screening criteria outlined in Section 5.1. These are the Sanday SAC and the East Sanday Coast SSSI. The Sanday SAC is designated for reefs, sandbanks, mudflats and sandflats (Table 5-1). Annex I 'Reefs' are a primary reason for the selection of this site; Annex I 'Sandbanks' and Annex I 'Mudflats and sandflats' are present as a qualifying feature but not a primary reason for selection of this site (JNCC 2025). This SAC is found 13.7 km northeast from the Project area. The East Sanday Coast SSSI is designated for rocky shores and sandflats (Table 5-1) (NatureScot, 2011). This SSSI is found 15.6 km northeast from the Project area.

Based on the potential pathways for LSE identified above and the European Site as having potential connectivity with the Westray Tidal Array, the determination of potential LSE is presented within Table 5-2 below. A justification is provided for each potential pathway to support the conclusion for whether there is or is not potential for LSE on the European Sites.

Table 5-2 Determination of potential LSE for European Site designated for Annex I habitats

BENTHIC QUALIFYING FEATURE	PROJECT PHASE	POTENTIAL PATHWAY FOR LSE	CONCLUSION	JUSTIFICATION
				SANDAY SAC
Reefs, Sandbanks and Mudflats and sandflats	Construction and Decommissioning	Substratum / habitat loss / damage from placement of devices and other infrastructure on the seabed, cable laying	No pathway for LSE	The Project does not overlap with the Sanday SAC and so there will be no habitat loss or damage. Thus this pathway has been screeded out for potential LSE on Annex I qualifying features of the Sanday SAC (i.e. reefs; sandbanks which are slightly covered by sea water all the time; mudflats and sandflats not covered by seawater at low tide).
Reefs, Sandbanks and Mudflats and sandflats	Construction and Decommissioning	Colonisation of hard infrastructure	No pathway for LSE	The introduction of hard infrastructure in an area may lead to an increase in the aggregation of predators (e.g. fish) or to colonisation by different species. These in turn may lead to some changes in community composition and dynamics of benthos (Raoux *et al.*, 2017). Any colonisation, however, is going to be limited to the immediate vicinity of the Project. Due to the relatively large distance between the area of proposed operations and Sanday SAC (i.e. 13.7 km) and the fact that the area of proposed operations hosts already hard substrates (Aurora 2005; Moore and Roberts 2011; Osiris 2014), the pathway has been screened out for potential LSE on all the Annex I qualifying features of the Sanday SAC.
Reefs, Sandbanks and Mudflats and sandflats	Construction and Decommissioning	Introduction of Marine Invasive Non Native (MINNS) Species	No pathway for LSE	The use of vessels during the construction Phase may facilitate the introduction of MINNS. The designated Annex I qualifying feature of Sanday SAC 'Reefs' could be colonised by MINNS which thrive on hard substrates (e.g. green sea-fingers *Codium fragile tomentosoides;* NatureScot 2025). The 'Sandbanks which are slightly covered by sea water all the time' and 'Mudflats and sandflats not covered by seawater at low tide' features could also potentially be colonised by MINNS found in soft sediments e.g. the orange tipped sea squirt (*Corella eumyota*) (NatureScot 2025). Although, most of the MINNS included in NatureScot (2025) are

BENTHIC QUALIFYING FEATURE	PROJECT PHASE	POTENTIAL PATHWAY FOR LSE	CONCLUSION	JUSTIFICATION
				associated with hard substrates. The examination of available information about suitable habitats for MINNS in Scottish waters (Scottish Government 2025; NatureScot 2025) indicate that the environmental conditions in the Project area (i.e. distance to shore, bathymetry, seabed features) do not seem to be ideal for MINNS. There is a relatively large distance between the Project area and Sanday SAC (13.7 km), while the Island of Eday can be expected to act as a barrier restricting the dispersal of any MINNS. Based on the above this pathway has been screeded out for potential LSE on all Annex I qualifying features of the Sanday SAC.
Reefs, Sandbanks and Mudflats and sandflats	Operation	Substratum / habitat loss / damage from placement of devices and other infrastructure on the seabed, cable laying	No pathway for LSE	The Project does not overlap with the Sanday SAC and thus there will be no habitat loss or damage. Thus this pathway has been screeded out for potential LSE on all Annex I qualifying features of the Sanday SAC.
Reefs, Sandbanks and Mudflats and sandflats	Operation	Changes to hydrodynamic regime leading to changes in benthic habitat	No pathway for LSE	There is a relatively large distance between the Project and the Sanday SAC (i.e. 13.7 km) while the Island of Eday is expected to act as a land barrier. In addition, the area is characterised by persistent strong hydrodynamic (tidal) conditions running broadly northwest to southeast, in a different direction and away from the Sanday SAC (Figure 5-1). Based on the above, this pathway has been screeded out for potential LSE on Annex I qualifying features of the Sanday SAC (i.e. reefs; sandbanks which are slightly covered by sea water all the time; mudflats and sandflats not covered by seawater at low tide).
Reefs, Sandbanks and Mudflats and sandflats	Operation	Colonisation of hard infrastructure	No pathway for LSE	The introduction of hard infrastructure in an area may lead to an increase in the aggregation of predators (e.g. fish) or to colonisation by different species. These in turn may lead to some changes in community composition and dynamics of benthos (Raoux *et al.*, 2017). Any colonisation, however, is going to be limited to the immediate vicinity of the Project. Due to the relatively large distance between the area of proposed operations and Sanday SAC (i.e. 13.7 km) and the fact that the area of proposed operations hosts already hard substrates

BENTHIC QUALIFYING FEATURE	PROJECT PHASE	POTENTIAL PATHWAY FOR LSE	CONCLUSION	JUSTIFICATION
				(Aurora 2005; Moore and Roberts 2011; Osiris 2014), the pathway has been screened out for potential LSE on all the Annex I qualifying features of the Sanday SAC.
Reefs, Sandbanks and Mudflats and sandflats	Operation	Introduction of Marine Invasive Non Native Species (MINNS)	No pathway for LSE	The use of vessels and the presence of infrastructure during the operation Phase may facilitate the introduction of MINNS. The designated Annex I qualifying feature of Sanday SAC 'Reefs' could be colonised by MINNS which thrive on hard substrates (e.g. green sea-fingers *Codium fragile tomentosoides;* NatureScot 2025). The 'Sandbanks which are slightly covered by sea water all the time' and 'Mudflats and sandflats not covered by seawater at low tide' features could also potentially be colonised by MINNS found in soft sediments e.g. the orange tipped sea squirt (*Corella eumyota*) (NatureScot 2025). Although, most of the MINNS included in NatureScot (2025) are associated with hard substrates. The examination of available information about suitable habitats for MINNS in Scottish waters (Scottish Government 2025; NatureScot 2025) indicate that the environmental conditions in the Project area (i.e. distance to shore, bathymetry, seabed features) do not seem to be ideal for MINNS. There is a relatively large distance between the Project area and Sanday SAC (13.7 km), while the Island of Eday can be expected to act as a barrier restricting the dispersal of any MINNS. Based on the above, this pathway has been screeded out for potential LSE on all Annex I qualifying features of the Sanday SAC.
Reefs, Sandbanks and Mudflats and sandflats	Operation	Impact to benthic communities from EMF or thermal load from export and inter-array cables	No pathway for LSE	While the Annex I habitats specially, won't be affected by EMF or thermal load the associated then communities might be. EMFs have the potential to alter the behaviour of marine organisms that are able to detect EMFs. Studies in Scotland on the behaviour and physiology of benthic invertebrate species (i.e. the sea star *Asterias rubens*, the sea urchin *Echinus esculentus*, the velvet crab *Necora puber*, the gastropod *Littorina littorea*) showed no significant difference between control and specimens exposed to power cable EMFs (Chapman *et al.*, 2023). Other studies on benthic species (lobsters) have shown subtle exploratory responses to EMFs (Hutchison *et al.*, 2020). There may be localised EMF effects from installed electrical

BENTHIC QUALIFYING FEATURE	PROJECT PHASE	POTENTIAL PATHWAY FOR LSE	CONCLUSION	JUSTIFICATION
				cables – however these will be of a relatively low voltage and there is also a large distance between the Project and the Sanday SAC (i.e. 13.7 km). Thermal emissions on the seabed are highly localised to the immediate surroundings of the cable. As cable thermal emissions are relatively low, the degree of heating is not likely to change perceptibly along the Project's cables. Considering the large distance between the Project and the Sanday SAC is concluded that any changes in thermal load will not affect the designated benthic features of Sanday SAC. Therefore, the pathway has been screened out for potential LSE on Annex I qualifying features of the Sanday SAC.
EAST SANDAY COAST SSSI				
Rocky shores, Sandflats	Construction and Decommissioning	Substratum / habitat loss / damage from placement of devices and other infrastructure on the seabed, cable laying	No pathway for LSE	The Project does not overlap with the East Sanday Coast SSSI and thus there will be no habitat loss or damage. Thus this pathway has been screeded out for potential LSE on the Annex I qualifying features of the East Sanday Coast SSSI (i.e. rocky shores, sandflats).
Rocky shores, Sandflats	Construction and Decommissioning	Colonisation of hard infrastructure	No pathway for LSE	The introduction of hard infrastructure in an area may lead to an increase in the aggregation of predators (e.g. fish) or to colonisation by different species. These in turn may lead to some changes in community composition and dynamics of benthos (Raoux *et al.*, 2017). Any colonisation, however, is going to be limited to the immediate vicinity of the Project. Due to the relatively large distance between the area of proposed operations and East Sanday Coast SSSI (i.e. 15.6 km) and the fact that the area of proposed operations hosts already hard substrates (Aurora 2005; Moore and Roberts 2011; Osiris 2014), the pathway has been screened out for potential LSE on all the Annex I qualifying features of the East Sanday Coast SSSI.

BENTHIC QUALIFYING FEATURE	PROJECT PHASE	POTENTIAL PATHWAY FOR LSE	CONCLUSION	JUSTIFICATION
Rocky shores, Sandflats	Construction and Decommissioning	Introduction of Marine Invasive Non Native (MINNS) Species	No pathway for LSE	The use of vessels during the construction Phase may facilitate the introduction of MINNS. The designated qualifying features of East Sanday Coast SSSI could be colonised by MINNS which thrive on hard substrates (e.g. green sea-fingers *Codium fragile tomentosoides;* NatureScot 2025). The sandflats feature could also potentially be colonised by MINNS found in soft sediments e.g. the orange tipped sea squirt (*Corella eumyota*) (NatureScot 2025). It should be mentioned though that most of the MINNS included in NatureScot (2025) are associated with hard substrates. The examination of available information about suitable habitats for MINNS in Scottish waters (Scottish Government 2025; NatureScot 2025) indicate that the environmental conditions in the Project area (i.e. distance to shore, bathymetry, seabed features) do not seem to be ideal for MINNS. There is a relatively large distance between the Project area and East Sanday Coast SSSI (15.6 km), while the Island of Eday can be expected to act as a barrier restricting the dispersal of any MINNS. Based on the above this pathway has been screeded out for potential LSE on all Annex I qualifying features of the East Sanday Coast SSSI.
Rocky shores, Sandflats	Operation	Substratum / habitat loss / damage from placement of devices and other infrastructure on the seabed, cable laying	No pathway for LSE	The Project does not overlap with the East Sanday Coast SSSI and thus there will be no habitat loss or damage. Thus this pathway has been screeded out for potential LSE on all Annex I qualifying features of the East Sanday Coast SSSI.
Rocky shores, Sandflats	Operation	Changes to hydrodynamic regime leading to changes in benthic habitat	No pathway for LSE	There is a relatively large distance between the Project and the East Sanday Coast SSSI (i.e. 15.6 km) while the Island of Eday is expected to act as a land barrier. In addition, the area is characterised by persistent strong hydrodynamic (tidal) conditions running broadly northwest to southeast, in a different direction and away from the East Sanday Coast SSSI (Figure 5-1). Based on the above, this pathway has been screeded out for potential LSE on qualifying features of the East Sanday Coast SSSI (i.e. rocky shores; sandflats).

BENTHIC QUALIFYING FEATURE	PROJECT PHASE	POTENTIAL PATHWAY FOR LSE	CONCLUSION	JUSTIFICATION
Rocky shores, Sandflats	Operation	Colonisation of hard infrastructure	No pathway for LSE	The introduction of hard infrastructure in an area may lead to an increase in the aggregation of predators (e.g. fish) or to colonisation by different species. These in turn may lead to some changes in community composition and dynamics of benthos (Raoux *et al.*, 2017). Any colonisation, however, is going to be limited to the immediate vicinity of the Project. Due to the relatively large distance between the area of proposed operations and East Sanday Coast SSSI (i.e. 15.6 km) and the fact that the area of proposed operations hosts already hard substrates (Aurora 2005; Moore and Roberts 2011; Osiris 2014), the pathway has been screened out for potential LSE on all the qualifying features of the East Sanday Coast SSSI.
Rocky shores, Sandflats	Operation	Introduction of Marine Invasive Non Native Species (MINNS)	No pathway for LSE	The use of vessels and the presence of infrastructure during the operation Phase may facilitate the introduction of MINNS. The qualifying feature of East Sanday Coast SSSI 'rocky shores' could be colonised by MINNS which thrive on hard substrates (e.g. green sea-fingers *Codium fragile tomentosoides;* NatureScot 2025). The 'sandflats' feature could also potentially be colonised by MINNS found in soft sediments e.g. the orange tipped sea squirt (*Corella eumyota*) (NatureScot 2025). It should be mentioned though that most of the MINNS included in NatureScot (2025) are associated with hard substrates. The examination of available information about suitable habitats for MINNS in Scottish waters (Scottish Government 2025; NatureScot 2025) indicate that the environmental conditions in the Project area (i.e. distance to shore, bathymetry, seabed features) do not seem to be ideal for MINNS. There is a relatively large distance between the Project area and East Sanday Coast SSSI (15.6 km), while the Island of Eday can be expected to act as a barrier restricting the dispersal of any MINNS. Based on the above, this pathway has been screeded out for potential LSE on all qualifying features of the East Sanday Coast SSSI.
Rocky shores, Sandflats	Operation	Impact to benthic communities from EMF or thermal load	No pathway for LSE	While the qualifying features specially, won't be affected by EMF or thermal load the associated then communities might be. EMFs have the potential to alter the behaviour of marine organisms that are able to detect EMFs. Studies in Scotland on the behaviour and physiology of benthic invertebrate species (i.e. the sea star *Asterias rubens*, the sea urchin *Echinus*

BENTHIC QUALIFYING FEATURE	PROJECT PHASE	POTENTIAL PATHWAY FOR LSE	CONCLUSION	JUSTIFICATION
		from export and inter-array cables		*esculentus*, the velvet crab *Necora puber*, the gastropod *Littorina littorea*) showed no significant difference between control and specimens exposed to power cable EMFs (Chapman *et al.*, 2023). Other studies on benthic species (lobsters) have shown subtle exploratory responses to EMFs (Hutchison *et al.*, 2020). There may be localised EMF effects from installed electrical cables – however these will be of a relatively low voltage and there is also a large distance between the Project and the East Sanday Coast SSSI (i.e. 15.6 km). Thermal emissions on the seabed are highly localised to the immediate surroundings of the cable. As cable thermal emissions are relatively low, the degree of heating is not likely to change perceptibly along the Project's cables. Considering the large distance between the Project and the East Sanday Coast SSSI is concluded that any changes in thermal load will not affect the designated benthic features of East Sanday Coast SSSI. Therefore, the pathway has been screened out for potential LSE on qualifying features of the East Sanday Coast SSSI.

Overall, it is therefore concluded that there is no connectivity between the Project and European sites designated for Annex I habitats and thus no potential for LSE. Based on that, the receptor topic 'European Sites designated for Annex I habitats' is screened out for potential LSE.

6 EUROPEAN SITES DESIGNATED FOR MARINE MAMMAL FEATURES

6.1 Initial Screening Criteria

The initial screening criteria that are applied to identify European sites with potential connectivity to the Project are:

- European sites which have a boundary that directly overlaps with the Project area; and
- European sites which are located within the range of connectivity (foraging range or Management Unit (MU)) of the Annex II marine mammal species for which they are designated.

This section considers five species of marine or aquatic mammal: the cetaceans harbour porpoise (*Phocoena phocoena*) and bottlenose dolphin (*Tursiops truncatus*), the harbour seal *(Phoca vitulina*) and grey seal (*Halichoerus grypus*), and Eurasian otter (*Lutra lutra*). These species are the marine mammals listed on Annex II of the European Union Habitats Directive which require the designation of SACs (NatureScot, 2019). The respective MU for the species informs the ZoI for the respective species and is used in completing the Screening Assessment.

6.1.1 Protected Sites

SACs designated for the five marine mammal species and coincident with the respective MU are illustrated in Figure 6-1 and described in more detail below.

There are two SACs designated for the conservation of marine mammals within the Orkney Islands, which fall within the North Coast and Orkney Seal Management Area (SMA) (i.e. #1 and 2 in Figure 6-1) and are specifically designated to protect key breeding colonies for seals:

- Faray and Holm of Faray SAC (located 1.8 km from the Westray Tidal Array) designated for the conservation of grey seals; and
- Sanday SAC (located 16.1 km from or North Sea the Westray Tidal Array) designated for harbour seal.

The Inter-Agency Marine Mammal Working Group (IAMMWG) has defined MUs for the seven most common cetacean species present within UK waters (IAMMWG, 2023). MUs are geographical areas within which a specific cetacean species can be found and for which management principles of offshore human activities are applied. The presence/absence, distribution and abundance data available for relevant MUs has been used to assess the likelihood of connectivity between the Westray Tidal Array and European Sites designated for the conservation of cetaceans.

There are no sites designated for the conservation of cetaceans within the vicinity of the Westray Tidal Array, occurring within the Central East Scotland (CES) MU (for bottlenose dolphin), or the North Sea or West Scotland MU (both for harbour porpoise). The closest site designated for the conservation of cetaceans is the Moray Firth SAC (located 131.2 km from the Westray Tidal Array, i.e. #4 in Figure 6-1) which represents key habitat for the only known resident population of bottlenose dolphin within the North Sea.

While otters (*Lutra lutra*) are present and are considered a qualifying feature for the Loch of Isbister SAC, located on the west of mainland Orkney (i.e. #3 in Figure 6-1), noting that they are not the primary reason for the designation of the site.

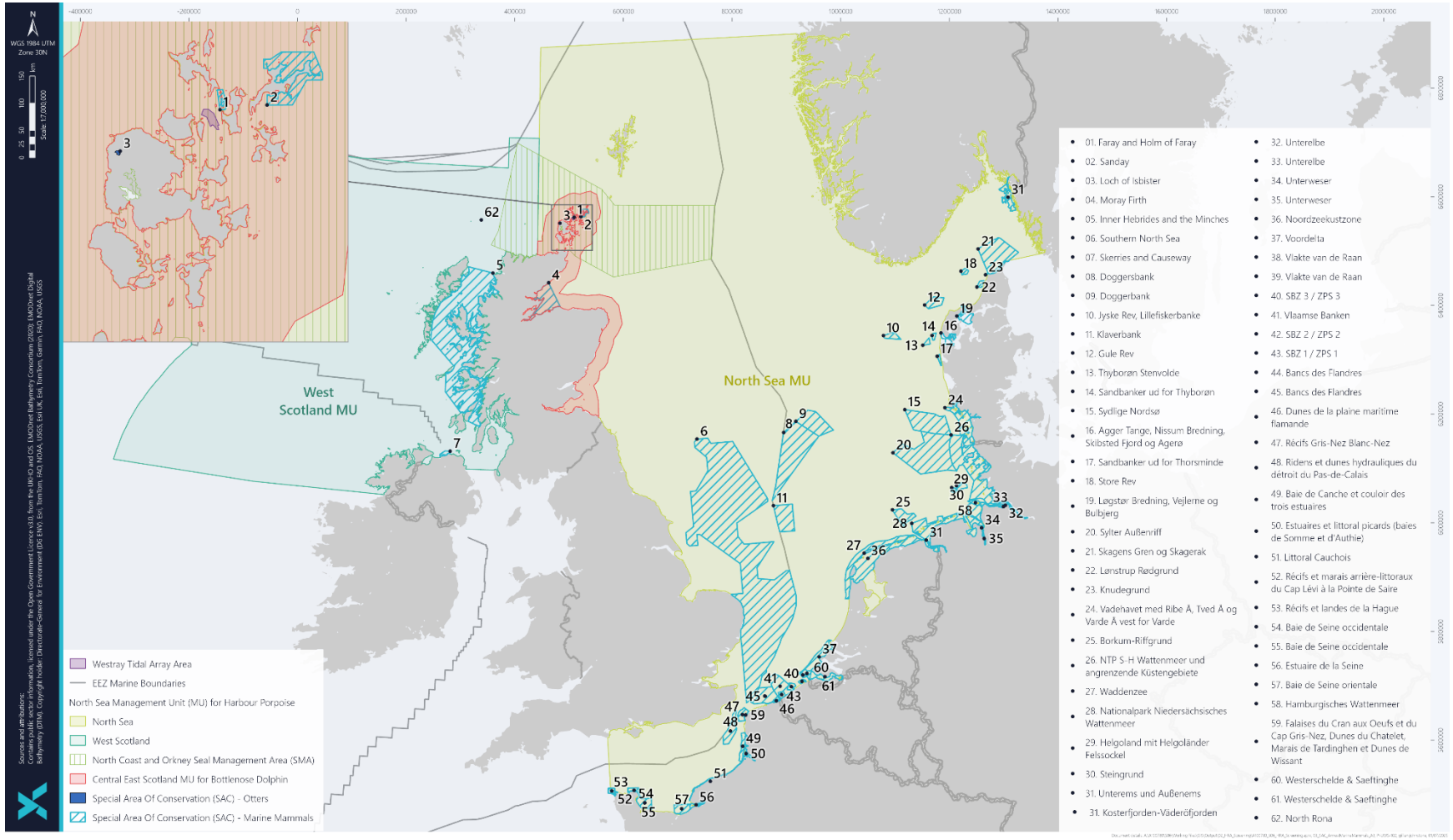

Figure 6-1 - Location of European sites designated for marine mammal features

6.1.2 Cetaceans and Pinnipeds

Historical boat-based Marine Mammal Observer (MMO) and ESAS surveys covering the Project area were undertaken between 2012-2014. During the most recent survey campaign of the Westray Tidal Array (undertaken between 2023-2025) boat-based PAM and ESAS visual surveys the following species were recorded within the immediate marine environment during the entire two-year survey period:

- Harbour porpoise (total n = 31);
- Risso's dolphin (total n = 17);
- Minke whale (total n = 5);
- Killer whale (total n = 3); and
- Basking shark (total n = 1).

Counts of seals at sea and at haul-out were also undertaken during the ESAS surveys. These observations include individuals that were swimming in the near vicinity (within approximately 100 m) of a haul-out site. During these observations a total of 43 seals at sea over the two years were identified, comprising 25 grey seals, 11 harbour seals and 7 unidentified seals.

Hauled-out seals were observed at a number of sites around the periphery of the survey area, including:

- Little Green Holm: peak monthly number of 286 animals, with a mean of 82 animals;
- Muckle Green Holm: peak monthly number of 107 animals with a mean of 19 animals;
- Eday South-West: peak monthly number of 7 animals with a mean of 1 animal;
- Seal Skerry: peak monthly number of 7 animals with a mean of 1 animal;
- Egilsay East: peak monthly number of 14 animals with a mean of 3 animals;
- Kili Holm (Egilsay N): peak monthly number of 42 animals with a mean of 5 animals; and
- Rusk Holm: peak monthly number of 114 animals with a mean of 28 animals.

A desk-based review of marine mammal presence and distribution throughout the UK marine region has been undertaken using a number of publicly available data sources, including Special Committee on Seals (SCOS), 2022; Carter *et al.*, 2022; Hammond *et al.*, 2021; Gilles *et al.*, 2023, Waggitt *et al.*, 2019; 2020 and Hague *et al.*, 2020.

6.1.3 Eurasian Otter

The Eurasian otter is a rarely sighted but widespread species, found in freshwater and coastal environments throughout the UK and Europe, with approximately 8,000 otters located throughout Scotland (NatureScot, 2025). Based on recorded observations presented on the National Biodiversity Network (NBN) Gateway, otters are present within the Westray Firth, and these observations are supported by EMEC Fall of Warness site-specific surveys undertaken between 2012 – 2014 which recorded a total of 16 otter sightings (EMEC, 2022). There were no otter observations recorded as part of the 2023-2025 survey campaign.

6.2 Identification of Sites and Features with Connectivity

6.2.1 Cetaceans

The Orbital Project area does not directly overlap or lie within close proximity of any site designated for the conservation of cetaceans. The nearest SACs with cetaceans as a qualifying feature are:

- Moray Firth SAC (#4 in Figure 6-1), designated for the conservation of the only known resident bottlenose dolphin population with the North Sea. This site is located 131.2 km to the south of the Westray Tidal Array;
- Inner Hebrides and the Minches SAC (#5 in Figure 6-1), designated for the conservation of harbour porpoise. This site is located 183.5 km to the west of the Westray Tidal Array; and
- Southern North Sea SAC (#6 in Figure 6-1), designated for the conservation of harbour porpoise. This site is located 449.2 km to the south of the Westray Tidal Array.

6.2.1.1 Harbour porpoise

Westray Tidal Array is located within the North Sea MU for harbour porpoise, within which there are several SACs designated for the conservation of harbour porpoise (as presented within Table 6-1 below). However, the closest SAC designated for the conservation of harbour porpoise is the Inner Hebrides and Minches SAC (183.5 km to the west of the Westray Tidal Array, i.e. #5 in Figure 6-1) which is located within the West Scotland MU for harbour porpoise, along with the Skerries and Causeway SAC (533.4 km from Westray Tidal Array, i.e. #7 in Figure 6-1).

Table 6-1 European Sites (SACs) with a harbour porpoise qualifying feature with the ID relating to that illustrated in Figure 6-1

SITE NAME	COUNTRY	DISTANCE TO PROJECT (KM)	ID
Inner Hebrides and Minches	United Kingdom	183.5	5
Southern North Sea	United Kingdom	449.2	6
Skerries and Causeway	United Kingdom	533.4	7
Doggerbank	Germany	501.8	8
Doggersbank	Netherlands	533.8	9
Jyske Rev, Lillefiskerbanke	Denmark	597.4	10
Klaverbank	Netherlands	622.4	11
Sydlige Nordsø	Denmark	689.1	15
Thyborøn Stenvolde	Denmark	669.2	13
Sylter Außenriff	Germany	708.1	20
Gule Rev	Denmark	652.8	12

SITE NAME	COUNTRY	DISTANCE TO PROJECT (KM)	ID
Sandbanker ud for Thyborøn	Denmark	676.7	14
Sandbanker ud for Thorsminde	Denmark	701.2	17
Agger Tange, Nissum Bredning, Skibsted Fjord og Agerø	Denmark	693.0	16
Vadehavet med Ribe Å, Tved Å og Varde Å vest for Varde	Denmark	752.8	24
Løgstør Bredning, Vejlerne og Bulbjerg	Denmark	719.9	19
Borkum-Riffgrund	Germany	778.3	25
NTP S-H Wattenmeer und angrenzende Küstengebiete	Germany	783.6	26
Store Rev	Denmark	716.6	18
Noordzeekustzone	Netherlands	781.1	36
Waddenzee	Netherlands	794.8	27
Lønstrup Rødgrund	Denmark	746.9	22
Nationalpark Niedersächsisches Wattenmeer	Germany	820.2	28
Knudegrund	Denmark	761.8	23
Helgoland mit Helgoländer Felssockel	Germany	827.7	29
Skagens Gren og Skagerak	Denmark	748.2	21
Steingrund	Germany	831.5	30
Unterems und Außenems	Germany	860.0	31
Hamburgisches Wattenmeer	Germany	865.1	58
Unterelbe	Germany	891.8	32/33
Unterweser	Germany	898.9	34/35
Kosterfjorden-Väderöfjorden	Sweden	824.5	31
Voordelta	Netherlands	875.6	37
Vlaamse Banken	Belgium	908.5	41
Vlakte van de Raan	Netherlands	899.6	38
Vlakte van de Raan	Belgium	900.9	39
Westerschelde and Saeftinghe	Netherlands	930.4	60/61
SBZ 3 / ZPS 3	Belgium	914.3	40
SBZ 2 / ZPS 2	Belgium	910.1	42
Bancs des Flandres	France	921.4	44/45

SITE NAME	COUNTRY	DISTANCE TO PROJECT (KM)	ID
SBZ 1 / ZPS 1	Belgium	917.8	43
Dunes de la plaine maritime flamande	France	951.7	46
Récifs Gris-Nez Blanc-Nez	France	957.6	47
Ridens et dunes hydrauliques du détroit du Pas-de-Calais	France	963.7	48
Falaises du Cran aux Oeufs et du Cap Gris-Nez, Dunes du Chatelet, Marais de Tardinghen et Dunes de Wissant	France	967.3	59
Baie de Canche et couloir des trois estuaires	France	1003.4	49
Estuaires et littoral picards (baies de Somme et d'Authie)	France	1024.6	50
Littoral Cauchois	France	1062.3	51
Récifs et marais arrière-littoraux du Cap Lévi à la Pointe de Saire	France	1179.2	52
Estuaire de la Seine	France	1149.9	56
Récifs et landes de la Hague	France	1211.6	53
Baie de Seine occidentale	France	1177.3	55
Baie de Seine orientale	France	1150.5	57

The Natura Casework Guidance on 'How to consider plans and projects affecting SACs and SPAs (NatureScot, 2014) state that in all cases, effects are likely to be significant and indicate an obvious need for appropriate assessment where an effect will:

1. Cause a reduction in the area of habitat or of the site;
2. Cause a direct of indirect change to the physical quality of a site or the habitats within a site; and/or
3. Cause an ongoing disturbance to a qualifying species or habitats.

As detailed in Section 3, works associated with the Westray Tidal Array are limited to the installation, operation and maintenance and decommissioning of up to 70 O2-X tidal turbines and up to five export cables Westray Tidal Array area and export cable between the Westray Tidal Array and EMEC Fall of Warness tidal demonstration site. As there is no piling proposed as part of the installation of the O2-X tidal turbines, the potential for underwater noise emissions introduced as part of installation activities will be limited.

Works will occur within a highly localised area and for a short-term duration. While there are a number of European Sites designated for the conservation of harbour porpoise within the North Sea MU, the closest site (the Inner Hebrides and the Minches SAC, i.e. #5 in Figure 6-1) is 183.5 km away. Due to this intervening distance, it is considered unlikely that any harbour porpoise associated with one of these European Sites will occur within the Westray Tidal

Array and adjacent waters, owing to the extensive available habitat found throughout the wider West Scotland and North Sea marine region. As all works associated with the Westray Tidal Array will be highly localised and temporary in nature, it is therefore considered that there is no potential connectivity between the Westray Tidal Array and any European Site designated for the conservation of harbour porpoise. Therefore, all sites identified within Table 6-1, in addition to the Inner Hebrides and Minches SAC(#5 in Figure 6-1 and Table 6-1) and Skerries and Causeway SAC (#7 in Figure 6-1 and Table 6-1), which are located within the West Scotland MU (Figure 6-1) have been screened out for further consideration.

6.2.1.2 Bottlenose dolphin

The closest SAC designated for the conservation of bottlenose dolphin is the Moray Firth SAC, located 131.2 km to the south of the Westray Tidal Array within the CES MU for bottlenose dolphin (#4 in Figure 6-1). While there is evidence of bottlenose dolphin movement offshore and throughout the coastal waters of the UK, sightings in inshore Orkney waters are uncommon (NBN Gateway, 2025). While the Westray Tidal Array lies within the same CES MU within which the Moray Firth SAC is located, the Westray Firth is not considered to represent key habitat for bottlenose dolphins. It is therefore considered unlikely that bottlenose dolphins designated as a qualifying feature of the Moray Firth SAC will encounter the Project. As such it is considered that there is no potential connectivity between the Westray Tidal Array and the Moray Firth SAC with respect to bottlenose dolphin and this site has been screened out from further consideration.

6.2.2 Pinnipeds

The foraging ranges of pinnipeds were used to determine the search area for European Sites with potential connectivity (Table 6-2). As the Westray Tidal Array is located within the North Coast and Orkney SMA, European Sites and designated haul out sites within this SMA have also been considered for potential connectivity with the Westray Tidal Array.

Table 6-2 Foraging ranges of pinnipeds used to identify European Sites with potential connectivity

SPECIES	JUSTIFICATION	SEARCH AREA (KM)
Harbour seal	Evidence suggests that harbour seals spend the majority of their time within 50 km of the coast (Jones *et al.*, 2015), with the highest densities located near haul out sites (Bailey *et al*, 2014). As such European Sites with a harbour seal qualifying feature within 50 km of the Westray Tidal Array have been screened in.	50
Grey seal	While there is evidence of grey seals making long distance trips from haul out sites (e.g., up to 200-350 km across the English Channel (Vincent *et al.*, 2016)), most seals spend the majority of their time (68.5%) close to their haul out sites, especially during the breeding season (Vincent *et al.*, 2016; Carter *et al.*, 2022). As such European Sites with a grey seal qualifying feature within 20 km of the Westray Tidal Array have been screened in.	20

While the Westray Tidal Array is not directly located within or adjacent to any European Site designated for the conservation of pinnipeds, there are two SACs located within the North Coast and Orkney SMA, within which the Project is also located:

- Sanday SAC (harbour seal); and
- Faray and Holm of Faray SAC (grey seal).

6.2.2.1 Harbour seal SACs

Harbour seal breed at several locations across the Orkney Islands, with haul out sites identified in different locations across the mainland and smaller islands throughout the region (MMPATF, 2025). The largest breeding colony of harbour seals within the Orkney Islands is located within the Sanday SAC (16.1 km from the Westray Tidal Array, i.e. #2 in Figure 6-1). This site is located within the foraging range of harbour seals, therefore there is the potential for animals associated with this breeding site to directly interact with works undertaken at the Westray Tidal Array. Despite this however, the foraging range of harbour seals (Table 6-2) extends beyond the Sanday SAC. It is therefore considered that not all harbour seals which have potential connectivity with the Westray Tidal Array will originate from the Sanday SAC.

There has been a major decline in harbour seal populations throughout the northeast of Scotland and Orkney in recent decades, with a ca. 85% regional decline in harbours seals within Orkney since the year 2000 (SCOS, 2022). Harbour seals associated with the Sanday SAC currently have an 'unfavourable, declining' status (condition last assessed in 2024) (NatureScot, 2025). As the Sanday SAC is located within the 50 km foraging range of harbour seals (Table 6-2) this site has been screened in for further consideration.

6.2.2.2 Grey seal SACs

Faray and Holm of Faray SAC is the closest European Site with grey seals as a qualifying feature (located 1.8 km from the Westray Tidal Array, i.e. #1 in Figure 6-1). The site is one of the most important grey seal breeding and haul out sites, supporting the second-largest breeding colony of grey seals within the UK and contributing to around 9% of annual UK pup production (JNCC, 2025). While the Faray and Holm of Faray SAC lies within the foraging range for grey seals, there are a number of grey seal haul out sites within the vicinity of the Westray Tidal Array from which grey seals occurring within the Project Area may originate. As such it cannot be assumed that all grey seals which have potential connectivity with the Westray Tidal Array are qualifying features of the Faray and Holm of Faray SAC.

Grey seals associated with the Faray and Holm of Faray SAC currently have an 'unfavourable, declining' status (condition last assessed in 2024) (NatureScot, 2025). As this site is located within the 20 km foraging range for grey seals (Table 6-2) this site has been screened in for further consideration.

6.2.3 Eurasian otter

While listed as a qualifying feature of the Loch of Isbister SAC, otters are not the primary reason for the designation of this site. The Loch of Isbister SAC (i.e. #3 in Figure 6-1) is a terrestrial SAC located 23.4 km from the Westray Tidal Array, supporting a 'favourable, maintained' otter population (condition last assessed in 2014) (NatureScot, 2025).

As detailed in Section 3, works associated with the Westray Tidal Array will occur within a highly localised area and for a short-term duration. As otters are unlikely to migrate the intervening 23.4 km between the Loch of Isbister SAC (i.e. #3 Figure 6-1) and the subsequent region of open water between the coast and the Westray Tidal Array, it is considered that there is no potential connectivity with the Westray Tidal Array and this site has been screened out for further consideration.

6.2.4 Initial Screening Results

Based on the initial screening results for cetaceans, pinnipeds and otters, the European Sites presented within Table 6-3 have been identified as having potential connectivity with the Westray Tidal Array and have therefore been taken forward for determination of potential LSE within Section 6.3.

There is no direct spatial overlap between the Westray Tidal Array and any European Site, as such connectivity and subsequent potential pathways for LSE have been determined using publicly available data and information to determine the likelihood that an animal designated as a qualifying feature for one of these European Sites will occur within the immediate vicinity of the Westray Tidal Array.

Table 6-3 Summary of European Sites taken forward for determination of potential LSE, with the ID relating to that illustrated in Figure 6-1

SITE NAME	COUNTRY	MARINE MAMMAL QUALIFYING FEATURE	DISTRANCE TO PROJECT (KM)	ID
Sanday SAC	United Kingdom (Scotland)	Harbour seal	16.1	2
Faray and Holm of Faray SAC	United Kingdom (Scotland)	Grey seal	1.8	1

6.3 Determination of Potential LSE

The potential pathways for LSE that have been considered for marine mammals are:

- Construction and decommissioning:
  - Disturbance and barrier effects on marine mammals and megafauna from underwater sound, including (but not limited to):
    - Potential drilling of tidal devices anchors;
    - Cable laying and other construction or maintenance activities; and
    - Vessels (underwater sound).
  - Disturbance at seal haul-out sites, including vessel movements to and from the site and port;
  - Collision risk with vessels; and
  - Indirect impacts on marine mammals due to changes in prey availability (based on the fish and shellfish ecology assessment).
- Operation:
  - Disturbance and barrier effects on marine mammals and megafauna from underwater sound;
  - Disturbance at seal haul-out sites, including vessel movements to and from the site and port;

- Collision risk with vessels;
- Marine mammal collision risk with operational devices;
- Barrier effects to marine mammals from physical presence of devices;
- Entanglement in mooring lines and ghost nets;
- Effects of electromagnetic fields; and
- Indirect impacts on marine mammals due to changes in prey availability (based on the fish and shellfish ecology assessment).

Based on the potential pathways for LSE identified above and the European Sites identified as having potential connectivity with the Westray Tidal Array, the determination of potential LSE is presented within Table 6-4 below. A justification is provided for each potential pathways to support the conclusion for whether there is or is not potential for LSE on a European Site.

Table 6-4 Determination of potential LSE for European Site designated for marine mammals

MARINE MAMMAL QUALIFYING FEATURE	PROJECT PHASE	POTENTIAL PATHWAY FOR LSE	CONCLUSION	JUSTIFICATION
			SANDAY SAC	
Harbour seal	Construction and decommissioning	Disturbance and barrier effects on marine mammals and megafauna from underwater sound	Potential pathway for LSE	Underwater sound associated with construction and decommissioning activities have the potential to result in a physical or behavioural impact to marine mammals (depending on the nature of the underwater sound and the hearing threshold of the affected marine mammal). The duration and intensity of underwater sound associated with construction and decommissioning activities has the potential to impact harbour seals within the area.
Harbour seal	Construction and decommissioning	Disturbance at seal haul-out sites, including vessel movements to and from the site and port	Potential pathway for LSE	Haul-out sites are protected under the Protection of Seals (Designation of Haul-out Sites) (Scotland) Order 2014. Vessel activity during the construction and decommissioning phase undertaken within close proximity to designated haul-out sites has the potential to lead to disturbance of seals. While the Sanday SAC is located 16.1 km from the Westray Tidal Array, the movement of vessels between the site and port has the potential to impact harbour seals at haul out.
Harbour seal	Construction and decommissioning	Collision risk with vessels	No pathway for LSE	Seals are highly mobile, agile species who are able to adjust swimming direction and speed rapidly to avoid vessels. During the construction and decommissioning phase, Project vessels are likely to be slow moving or stationary within the array area as works are conducted, therefore ship strikes are considered unlikely. This pathway has been screened out for potential LSE on harbour seal qualifying features of the Sanday SAC.
Harbour seal	Construction and decommissioning	Indirect impacts on marine mammals due to changes in prey availability	Potential pathway for LSE	Works associated with the construction and decommissioning of Westray Tidal Array have the potential to result in effects to fish and shellfish species which are considered prey for marine mammals. While the Sanday SAC is located 16.1 km from the Westray Tidal Array, harbour seals can forage at distances up to 50 km from their haul out site (JNCC, 2017).

MARINE MAMMAL QUALIFYING FEATURE	PROJECT PHASE	POTENTIAL PATHWAY FOR LSE	CONCLUSION	JUSTIFICATION
				Therefore changes to prey availability during the construction and decommissioning phased has been screened in for potential LSE for harbour seals qualifying features of the Sanday SAC.
Harbour seal	Operation	Disturbance and barrier effects on marine mammals from underwater sound	Potential pathway for LSE	Underwater sound associated with operational tidal turbines have the potential to result in a physical or behavioural impact to marine mammals (depending on the nature of the underwater sound and the hearing threshold of the affected marine mammal). The duration and intensity of underwater sound associated with an operational tidal turbine has the potential to impact harbour seals associated with the Sanday SAC.
Harbour seal	Operation	Disturbance at seal haul-out sites, including vessel movements to and from the site and port	Potential pathway for LSE	Haul-out sites are protected under the Protection of Seals (Designation of Haul-out Sites) (Scotland) Order 2014. Vessel activity during the operation phase undertaken within close proximity to designated haul-out sites has the potential to lead to disturbance of seals. While the Sanday SAC is located 16.1 km from the Westray Tidal Array, the movement of vessels between the site and port has the potential to impact harbour seals at haul out.
Harbour seal	Operation	Collision risk with vessels	No pathway for LSE	Seals are highly mobile, agile species who are able to adjust swimming direction and speed rapidly to avoid vessels. During the operation and maintenance phase the number of vessels operating within the array area is anticipated to be lower than during the construction and decommissioning phase. During the operation and maintenance phase Project vessels are likely to be slow moving or stationary within the array area as works are conducted, therefore ship strikes are considered unlikely. This pathway has been screened out for potential LSE on harbour seal qualifying features of the Sanday SAC.
Harbour seal	Operation	Marine mammal collision risk with operational devices	Potential pathway for LSE	The potential for tidal devices to present a collision risk to marine mammals is poorly understood, which device size, location, array configuration and water depth considered to influence the likelihood of marine mammals collision risk. Owing to the lack of

MARINE MAMMAL QUALIFYING FEATURE	PROJECT PHASE	POTENTIAL PATHWAY FOR LSE	CONCLUSION	JUSTIFICATION
				understanding of potential collision risk, this pathway has been screened in for harbour seals associated with the Sanday SAC.
Harbour seal	Operation	Barrier effects to marine mammals from physical presence of devices	Potential pathway for LSE	The physical presence of tidal devices has the potential to result in small scale, localised barrier effect for marine mammals utilising the Westray Firth and Stronsay Firth. While seals are agile, highly mobile animals who able to move both around and through the array as required, the physical presence of tidal devices at an array scale (either alone or in combination) has the potential to limit or restrict movement of seals within the immediate marine region.
Harbour seal	Operation	Entanglement in mooring lines (direct) and ghost nets (secondary)	Potential pathway for LSE	There is no evidence of marine mammals becoming entangled within the mooring lines of floating infrastructure, with the highly mobile and agile nature of seals allowing them to avoid direct entanglement with mooring lines. However there is the potential for lost (ghost) fishing gear entangled on mooring lines to create a secondary entanglement risk for seals. Therefore, this potential pathway for LSE has been screened in for harbour seals designated as a qualifying feature of the Sanday SAC.
Harbour seal	Operation	Effects of electromagnetic fields (EMF) (indirect effects to prey for marine mammals)	No potential pathway for LSE	The nature of Project design (as detailed in Section 3) will give consideration to minimising the potential effects of EMFs through the burial of inter-array and export cables as far as practicable. Where burial is not possible or not completed due to the cable installation method, additional cable protection may be applied as far as practicable, which provides the secondary benefit of minimising the potential for EMFs. However, to date no study has indicated that EMF from marine renewable energy projects would be likely to have an important impact on marine mammals. Based upon the low likelihood of any ecological effects of EMFs on seals, this pathway has been screened out for potential LSE on harbour seal qualifying features of the Sanday SAC.

MARINE MAMMAL QUALIFYING FEATURE	PROJECT PHASE	POTENTIAL PATHWAY FOR LSE	CONCLUSION	JUSTIFICATION
Harbour seal	Operation	Indirect impacts on marine mammals due to changes in prey availability	Potential pathway for LSE	While works associated with the operation and maintenance of the Westray Tidal Array are anticipated to be highly localised and for a shorter term duration than those anticipated during the construction and decommissioning phase, there is the potential for works to result in effect to fish and shellfish species which are considered prey for seals. Therefore this potential pathway for LSE has been screened in for harbour seals designated as a qualifying feature of the Sanday SAC.
FARAY AND HOLM OF FARAY SAC				
Grey seal	Construction and decommissioning	Disturbance and barrier effects on marine mammals and megafauna from underwater sound	Potential pathway for LSE	Underwater sound associated with construction and decommissioning activities have the potential to result in a physical or behavioural impact to marine mammals (depending on the nature of the underwater sound and the hearing threshold of the affected marine mammal). The duration and intensity of underwater sound associated with construction and decommissioning activities has the potential to impact grey seals within the area.
Grey seal	Construction and decommissioning	Disturbance at seal haul-out sites, including vessel movements to and from the site and port	Potential pathway for LSE	Haul-out sites are protected under the Protection of Seals (Designation of Haul-out Sites) (Scotland) Order 2014. Vessel activity during the construction and decommissioning phase undertaken within close proximity to designated haul-out sites has the potential to lead to disturbance of seals. While the Faray and Holm of Faray SAC is located 1.8 km from the Westray Tidal Array, the movement of vessels between the site and port has the potential to impact grey seals at haul out.
Grey seal	Construction and decommissioning	Collision risk with vessels	No pathway for LSE	Seals are highly mobile, agile species who are able to adjust swimming direction and speed rapidly to avoid vessels. During the construction and decommissioning phase, Project vessels are likely to be slow moving or stationary within the array area as works are conducted, therefore ship strikes are considered unlikely. This pathway has been screened out for potential LSE on grey seal qualifying features of the Faray and Holm of Faray SAC.

MARINE MAMMAL QUALIFYING FEATURE	PROJECT PHASE	POTENTIAL PATHWAY FOR LSE	CONCLUSION	JUSTIFICATION
Grey seal	Construction and decommissioning	Indirect impacts on marine mammals due to changes in prey availability	Potential pathway for LSE	Works associated with the construction and decommissioning of Westray Tidal Array have the potential to result in effects to fish and shellfish species which are considered prey for marine mammals. While the Faray and Holm of Faray SAC is located 1.8 km from the Westray Tidal Array, grey seals can forage at distances >200 km from their haul out site (Vincent *et al.*, 2016). Changes to prey availability during the construction and decommissioning phased has been screened in for potential LSE for grey seals qualifying features of the Faray and Holm of Faray SAC.
Grey seal	Operation	Disturbance and barrier effects on marine mammals and megafauna from underwater sound	Potential pathway for LSE	Underwater sound associated with operational tidal turbines have the potential to result in a physical or behavioural impact to marine mammals (depending on the nature of the underwater sound and the hearing threshold of the affected marine mammal). The duration and intensity of underwater sound associated with an operational tidal turbine has the potential to impact grey seals associated with the Faray and Holm of Faray SAC.
Grey seal	Operation	Disturbance at seal haul-out sites, including vessel movements to and from the site and port	Potential pathway for LSE	Haul-out sites are protected under the Protection of Seals (Designation of Haul-out Sites) (Scotland) Order 2014. Vessel activity during the operation phase undertaken within close proximity to designated haul-out sites has the potential to lead to disturbance of seals. While the Faray and Holm of Faray SAC is located 1.8 km from the Westray Tidal Array, the movement of vessels between the site and port has the potential to impact harbour seals at haul out.
Grey seal	Operation	Collision risk with vessels	No pathway for LSE	Seals are highly mobile, agile species who are able to adjust swimming direction and speed rapidly to avoid vessels. During the operation and maintenance phase the number of vessels operating within the array area is anticipated to be lower than during the construction and decommissioning phase. During the operation and maintenance phase Project vessels are likely to be slow moving or stationary within the array area as works are conducted, therefore ship strikes are considered unlikely. This pathway has been screened out for potential LSE on grey seal qualifying features of the Faray and Holm of Faray SAC.

MARINE MAMMAL QUALIFYING FEATURE	PROJECT PHASE	POTENTIAL PATHWAY FOR LSE	CONCLUSION	JUSTIFICATION
Grey seal	Operation	Marine mammal collision risk with operational devices	Potential pathway for LSE	The potential for tidal devices to present a collision risk to marine mammals is poorly understood, which device size, location, array configuration and water depth considered to influence the likelihood of marine mammals collision risk. Owing to the lack of understanding of potential collision risk, this pathway has been screened in for grey seals associated with the Faray and Holm of Faray SAC.
Grey seal	Operation	Barrier effects to marine mammals from physical presence of devices	Potential pathway for LSE	The physical presence of tidal devices has the potential to result in small scale, localised barrier effect for marine mammals utilising the Westray Firth and Stronsay Firth. While seals are agile, highly mobile animals who able to move both around and through the array as required, the physical presence of tidal devices at an array scale (either alone or in combination) has the potential to limit or restrict movement of seals within the immediate marine region.
Grey seal	Operation	Entanglement in mooring lines and ghost nets	Potential pathway for LSE	There is limited evidence of marine mammals becoming entangled within the mooring lines of floating infrastructure, with the highly mobile and agile nature of seals allowing them to avoid direct entanglement with mooring lines. However there is the potential for lost (ghost) fishing gear entangled on mooring lines to create a secondary entanglement risk for seals. Therefore, this potential pathway for LSE has been screened in for grey seals.
Grey seal	Operation	Effects of electromagnetic fields	No potential pathway for LSE	The nature of Project design (as detailed in Section 3) will give consideration to minimising the potential effects of EMFs through the burial of inter-array and export cables as far as practicable. Where burial is not possible or not completed due to the cable installation method, additional cable protection may be applied as far as practicable, which provides the secondary benefit of minimising the potential for EMFs. However, to date no study has indicated that EMF from marine renewable energy projects would be likely to have an important impact on marine mammals. Based upon the low likelihood of any ecological effects of EMFs on seals, this pathway has been screened out for potential LSE on grey seal qualifying features of the Faray and Holm of Faray SAC.

MARINE MAMMAL QUALIFYING FEATURE	PROJECT PHASE	POTENTIAL PATHWAY FOR LSE	CONCLUSION	JUSTIFICATION
Grey seal	Operation	Indirect impacts on marine mammals due to changes in prey availability	Potential pathway for LSE	While works associated with the operation and maintenance of the Westray Tidal Array are anticipated to be highly localised and for a shorter term duration than those anticipated during the construction and decommissioning phase, there is the potential for works to result in effect to fish and shellfish species which are considered prey for seals. Therefore this potential pathway for LSE has been screened in for grey seals designated as a qualifying feature of the Faray and Holm of Faray SAC.

7 EUROPEAN SITES DESIGNATED FOR ORNITHOLOGICAL FEATURES

7.1 Initial Screening Criteria

The initial screening criteria used to identify relevant European sites in relation to the Project is described b. ow:

- European sites that overlap with the Project and are designated for bird features (this includes direct overlap between the Project boundary and SPAs);
- European sites with marine bird qualifying features that may have connectivity with the potential effects of the Project due to their range (e.g. breeding, foraging, and as habitat during breeding and overwintering); and
- Consideration is also given to designated sites with bird qualifying features that have migratory ranges that may overlap with the Project.

7.1.1 Protected Sites

Multiple SPAs with interest features which utilise the Orkney region are within the foraging for the respective species. The consideration of the SPAs and features is explored in greater detail in Section 7.2 below.

7.1.2 Ornithology Species

The boat-based Westray marine wildlife surveys (undertaken between April 2023 – March 2025) as introduced in Section 4.3 and encompassing ESAS surveys across the Westray Tidal Array have been used to inform the presence of bird species in the vicinity of the Project. A summary of the species identified during the surveys along with their counts across the two-years of survey are presented in Table 7-1.

Table 7-1 Summary of bird species recorded during the two-year survey campaign of the Westray Tidal Array. These are categorised into flying and non-flying bird observations.

SPECIES	TOTAL COUNT (FLYING)	TOTAL COUNT (NON-FLYING)
Gannet	494	71
Fulmar	1552	766
Puffin	358	526
Black guillemot	792	2417
Shag	756	1529
Cormorant	63	25
Razorbill	506	204
Guillemot	4375	1019

SPECIES	TOTAL COUNT (FLYING)	TOTAL COUNT (NON-FLYING)
Guillemot/razorbill	2173	11
Great northern diver	0	114
White-billed diver	0	13
Red-throated diver	0	11
Indeterminate diver	0	7
Kittiwake	777	52
Common gull	218	35
Herring gull	120	17
Great black-backed gull	89	84
Arctic skua	10	2
Great skua	32	24
Eider	77	97
Long-tailed duck	12	20

7.2 Identification of Sites and Features with Connectivity

7.2.1 European Sites Overlapping with the Project

There is no direct overlap between the Project and any SPA.

7.2.2 European Sites with Potential Connectivity

A variety of bird species are likely to occur within the Project boundary and surrounding areas. These species have been grouped into categories to assist with this screening process. The categories have been established from a variety of factors including breeding biology, feeding, habitat use and migratory pathways. The categories are:

- Breeding seabirds;
- Non-breeding seabirds; and
- Terrestrial birds (which includes breeding, migrating, and wintering waterbirds).

7.2.2.1 Breeding seabirds

Seabirds which are qualifying features of a number of SPAs may use the waters in and around the Project during the breeding season (e.g. for foraging). Breeding seabirds can be described as central place foragers whereby they are required to return to a single geographical location (the breeding colony or nest site) to incubate eggs and

brood/provision their young, between bouts of foraging at sea. Woodward *et al.* (2019) provide the most recent data on recorded foraging ranges for a wide range of species, including the mean maximum foraging range.

To determine potential connectivity between a seabird breeding colony SPA and the Project, for most of the species the foraging range used is the mean maximum distance plus one standard deviation (MMFR + 1SD) as presented in Woodward *et al.* (2019), in line with NatureScot Guidance Note 3 (NatureScot, 2023a) and advice set out in the Orbital Scoping Opinion (MD-LOT, 2024). These are provided in Table 7-2. For some species, mean maximum ranges are not available and mean ranges are given. Potential connectivity to marine SPAs is also established through consideration of connectivity from functionally linked seabird colony SPAs i.e. using the recommended 'at sea' foraging ranges from Woodward *et al.* (2019).

Additionally, NatureScot provided specific advice with regards to gannet, razorbill and guillemot, where maximum values may not reflect the conditions typically faced by birds at a given breeding colony (NatureScot, 2023a). Site-specific data have presented a more robust evidence base for the follow species and sites:

- For gannet, NatureScot advise consideration of site-specific maximum foraging ranges for Forth Islands SPA, St Kilda SPA and Grassholm SPA; and
- For guillemot and razorbill, NatureScot advise use of mean maximum foraging range + 1SD, including data from Fair Isle, for all Northern Isles designated sites. For all designated sites south of the Pentland Firth (including North Caithness Cliffs SPA), they advised use of MMFR + 1SD discounting Fair Isle values.

Table 7-2 Mean maximum breeding bird season foraging ranges for qualifying seabird species

SPECIES	FORAGING RANGE (KM)	FORAGING RANGE METRIC
Common eider	21.5	Maximum
Arctic skua	2.7	Data deficient
Arctic tern	40.5	Mean max + 1SD
Atlantic puffin	265.4	Mean max + 1SD
Black-headed gull	18.5	Maximum
Black-legged kittiwake	300.6	Mean max + 1SD
Common guillemot	153.7	Mean max + 1SD
Common gull	50	Maximum
Common tern	26.9	Mean max + 1SD
Cormorant	33.9	Mean max + 1SD
European shag	23.7	Mean max + 1SD
European Storm Petrel	336.0	Maximum
Great black-backed gull	73.0	Maximum

SPECIES	FORAGING RANGE (KM)	FORAGING RANGE METRIC
Great skua	931.2	Mean max + 1SD
Herring gull	85.6	Mean max + 1SD
Leach's storm petrel	657.0	Mean
Lesser black-backed gull	236.0	Mean max + 1SD
Little tern	5	Maximum
Manx shearwater	2,365.5	Mean max + 1SD
Mediterranean gull	20	Max
Northern fulmar	1,200.2	Mean max + 1SD
Razorbill	164.6	Mean max + 1SD
Red-throated diver	9	Maximum
Roseate tern	23.2	Mean max + 1SD
Sandwich tern	57.5	Mean max + 1SD
Northern gannet	509.4	mean max +1SD
Northern gannet (Forth Island SPA)	216.7	Site-specific maximum
Northern gannet (Grassholm SPA)	516.7	Site-specific maximum
Northern gannet (St Kilda SPA)	709.0	Site-specific maximum
Common guillemot (North of Pentland Firth)	153.7	mean max+1SD, including data from Fair Isle
Common guillemot (South of Pentland Firth)	95.2	Mean max+1SD discounting Fair Isle values
Razorbill (North of Pentland Firth)	164.6	mean max+1SD, including data from Fair Isle
Razorbill (South of Pentland Firth)	95.2	mean max+1SD discounting Fair Isle values
Black guillemot	No SPAs for this species, therefore not included[8].	

Two marine SPAs with red-throated divers have the potential for connectivity: North Orkney SPA and Scapa Flow SPA. Marine SPAs are designed to protect foraging areas of breeding red-throated diver, and therefore largely cover inshore waters most likely to be used by red-throated diver. Marine SPA populations are estimated as the numbers of breeding pairs within a 10 km range of a marine SPA, and may include red-throated divers from breeding SPAs on land, as well as from non-SPA sites. Red-throated divers breeding at the Orkney Mainland Moors SPA may be using the North Orkney SPA and Scapa Flow SPAs to forage. As the Project does not overlap with either the North Orkney SPA or the Scapa Flow SPA, there are no impact pathways affecting the ability of the site to maintain the current extent, quality and distribution of supporting habitats within the site as well as ensuring a sufficient food supply within the site. However, due to the proximity of the North Orkney SPA to the Project, there the possibility of

[8] *This species is a qualifying feature of the Papa Westray MPA, which lies approximately 16 km of the Project site. Black guillemot has relatively short foraging range (maximum range 8 km, Woodward et al., 2019). Therefore it is unlikely that there is more than negligible connectivity with this MPA.*

disturbance due to the presence of Project vessels. Due to the intervening distance between Project and Scapa Flow SPA, with no direct connectivity associated with red-throated diver interest feature, there is no impact pathway to the site and interest feature.

As per Guidance Note 3 (NatureScot, 2023a), connectivity to breeding SPAs during the breeding season for red-throated divers is determined using the foraging range (9 km; Table 7-2). Therefore, As the Orkney Mainland Moors SPA is located 14.1 km away from the Project, there is no connectivity to the Project.

Breeding seabird SPAs with the potential for connectivity are provided in Table 7-3 and illustrated in Figure 7-1. Sites that do not have any connectivity with any designated features of the site are not shown in Table 7-3 and illustrated in Figure 7-1.

Table 7-3 Breeding seabird colony SPAs that may have connectivity to the Project, with the ID relating to that illustrated in Figure 7-1. Sites with no potential for connectivity are not shown in the table.

SPA	DISTANCE TO PROJECT (KM)	QUALIFYING INTEREST/FEATURES	PROJECT WITHIN FORAGING RANGE	POTENTIAL FOR CONNECTIVITY	ID
SCOTLAND					
North Orkney (marine SPA)	< 0.1	Red-throated diver	Yes	Yes	1
Rousay	<1	Arctic skua	Yes	Yes	2
		Arctic tern	Yes		
		Fulmar	Yes		
		Common guillemot	Yes		
		Kittiwake	Yes		
		Seabird assemblage	Yes		
Calf of Eday	7.2	Cormorant	Yes	Yes	3
		Fulmar	Yes		
		Great black-backed gull	Yes		
		Common guillemot	Yes		
		Kittiwake	Yes		
		Seabird assemblage	Yes		
West Westray	8.0	Arctic skua	No	Yes	4
		Arctic tern	Yes		
		Fulmar	Yes		
		Common guillemot	Yes		
		Kittiwake	Yes		
		Razorbill	Yes		
		Seabird assemblage	Yes		
Papa Westray (North Hill and Holm)	16.0	Arctic skua	No	Yes	5
		Arctic tern	Yes		
Auskerry	19.1	Arctic tern	Yes	Yes	6
		European storm petrel	Yes		
Marwick Head	23.9	Common guillemot	Yes	Yes	8
		Kittiwake	Yes		

SPA	DISTANCE TO PROJECT (KM)	QUALIFYING INTEREST/FEATURES	PROJECT WITHIN FORAGING RANGE	POTENTIAL FOR CONNECTIVITY	ID
		Seabird Assemblage	Yes		
Copinsay	25.4	Fulmar	Yes	Yes	9
		Great black-backed gull	Yes		
		Common guillemot	Yes		
		Kittiwake	Yes		
		Seabird Assemblage	Yes		
Hoy	33.4	Arctic skua	No	Yes	10
		Fulmar	Yes		
		Great black-backed gull	Yes		
		Common guillemot	Yes		
		Kittiwake	Yes		
		Great skua	Yes		
		Puffin	Yes		
		Seabird Assemblage	Yes		
North Caithness Cliffs	49.0	Fulmar	Yes	Yes	11
		Common guillemot	Yes		
		Kittiwake	Yes		
		Puffin	Yes		
		Razorbill	Yes		
		Seabird Assemblage	Yes		
Fair Isle	72.7	Arctic skua	No	Yes	12
		Arctic tern	No		
		Fulmar	Yes		
		Common guillemot	Yes		
		Gannet	Yes		
		Kittiwake	Yes		
		Great skua	Yes		
		Puffin	Yes		
		Razorbill	Yes		

SPA	DISTANCE TO PROJECT (KM)	QUALIFYING INTEREST/FEATURES	PROJECT WITHIN FORAGING RANGE	POTENTIAL FOR CONNECTIVITY	ID
		European shag	No		
		Seabird assemblage	Yes		
Seas off Foula (marine SPA)	78.7	Arctic skua	No	Yes	13
		Fulmar	Yes		
		Great skua	Yes		
		Guillemot	Yes		
		Puffin	Yes		
		Seabird assemblage	Yes		
East Caithness Cliffs	78.9	Fulmar	Yes	Yes	14
		Cormorant	No		
		Great black-backed gull	No		
		Common guillemot	Yes		
		Herring gull	Yes		
		Kittiwake	Yes		
		Razorbill	Yes		
		European shag	No		
		Seabird assemblage	Yes		
Sule Skerry and Sule Stack	81.3	Common guillemot	Yes	Yes	15
		Gannet	Yes		
		Puffin	Yes		
		European shag	No		
		Leach's petrel	Yes		
		Seabird Assemblage	Yes		
		European storm petrel	Yes		
Foula	105.4	Fulmar	Yes	Yes	16
		Common guillemot	Yes		
		Kittiwake	Yes		
		Great skua	Yes		
		Puffin	Yes		
		Razorbill	Yes		

SPA	DISTANCE TO PROJECT (KM)	QUALIFYING INTEREST/FEATURES	PROJECT WITHIN FORAGING RANGE	POTENTIAL FOR CONNECTIVITY	ID
		European shag	No		
		Arctic tern	No		
		Arctic skua	No		
		Leach's petrel	Yes		
		Seabird assemblage	Yes		
Sumburgh Head	110.9	Fulmar	Yes	Yes	17
		Arctic tern	No		
		Common guillemot	Yes		
		Kittiwake	Yes		
		Seabird assemblage	Yes		
Cape Wrath	122.6	Fulmar	Yes	Yes	18
		Common guillemot	No		
		Kittiwake	Yes		
		Puffin	Yes		
		Razorbill	No		
		Seabird assemblage			
Mousa	127.6	European storm petrel	Yes	Yes	19
		Arctic tern	No		
Noss	141.2	Fulmar	Yes	Yes	20
		Common guillemot	Yes		
		Gannet	Yes		
		Kittiwake	Yes		
		Great skua	Yes		
		Puffin	Yes		
		Seabird Assemblage	Yes		
Handa	151.3	Fulmar	Yes	Yes	21
		Common guillemot	No		
		Kittiwake	Yes		
		Great skua	Yes		
		Razorbill	No		

SPA	DISTANCE TO PROJECT (KM)	QUALIFYING INTEREST/FEATURES	PROJECT WITHIN FORAGING RANGE	POTENTIAL FOR CONNECTIVITY	ID
		Seabird Assemblage	Yes		
Troup, Pennan and Lion's Heads	158.6	Fulmar	Yes	Yes	22
		Common guillemot	No		
		Kittiwake	Yes		
		Razorbill	No		
		Herring gull	No		
		Seabird assemblage	Yes		
North Rona and Sula Sgeir	159.5	Fulmar	Yes	Yes	23
		Common guillemot	No		
		Gannet	Yes		
		Great black-backed gull	No		
		Kittiwake	Yes		
		Puffin	Yes		
		Razorbill	No		
		Leach's petrel	Yes		
		Seabird Assemblage	Yes		
		European storm petrel	Yes		
Ronas Hill - North Roe and Tingon	161.7	Great skua	Yes	Yes	24
Fetlar	180.0	Fulmar	Yes	Yes	25
		Great skua	Yes		
		Arctic skua	No		
		Arctic tern	No		
		Seabird Assemblage	Yes		
Ramna Stacks and Gruney	180.6	Leach's petrel	Yes	Yes	54
Buchan Ness to Collieston Coast	190.5	Fulmar	Yes	Yes	26
		Common guillemot	No		
		Herring gull	No		
		Kittiwake	Yes		
		European shag	No		

SPA	DISTANCE TO PROJECT (KM)	QUALIFYING INTEREST/FEATURES	PROJECT WITHIN FORAGING RANGE	POTENTIAL FOR CONNECTIVITY	ID
		Seabird Assemblage	Yes		
Hermaness, Saxa Vord and Valla Field	197.2	Fulmar	Yes	Yes	27
		Common guillemot	No		
		Gannet	Yes		
		Kittiwake	Yes		
		Great skua	Yes		
		Puffin	Yes		
		European shag	No		
		Red-throated diver	No		
		Seabird assemblage	Yes		
Priest Island (Summer Isles)	197.3	European storm petrel	Yes	Yes	28
Shiant Isles	235.0	Fulmar	Yes	Yes	29
		Common guillemot	No		
		Kittiwake	Yes		
		Puffin	Yes		
		Razorbill	No		
		European shag	No		
		Seabird assemblage	Yes		
Fowlsheugh	242.2	Fulmar	Yes		30
		Common guillemot	No		
		Herring gull	No		
		Kittiwake	Yes		
		Seabird assemblage	Yes		
		Razorbill	No		
Flannan Isles	276.9	Fulmar	Yes	Yes	31
		Common guillemot	No		
		Kittiwake	Yes		
		Puffin	No		
		Razorbill	No		
		Leach's storm petrel	Yes		

SPA	DISTANCE TO PROJECT (KM)	QUALIFYING INTEREST/FEATURES	PROJECT WITHIN FORAGING RANGE	POTENTIAL FOR CONNECTIVITY	ID
		Seabird assemblage	Yes		
Seas off St Kilda (marine SPA)	290.7	Fulmar	Yes	Yes	55
		Gannet	Yes		
		Common guillemot	No		
		Puffin	No		
		Storm petrel	Yes		
		Seabird assemblage	Yes		
Rum	292.6	Common guillemot	No	Yes	32
		Kittiwake	Yes		
		Manx shearwater	Yes		
		Seabird assemblage	Yes		
St Kilda	342.0	Fulmar	Yes	Yes	33
		Common guillemot	No		
		Gannet	Yes		
		Great skua	Yes		
		Puffin	No		
		Razorbill	No		
		European storm petrel	No		
		Kittiwake	No		
		Leach's petrel	Yes		
		Manx shearwater	Yes		
		Seabird assemblage	Yes		
Mingulay and Berneray	368.4	Fulmar	Yes	Yes	34
		Common guillemot	No		
		Kittiwake	No		
		Puffin	No		
		Razorbill	No		
		European shag	No		
		Seabird assemblage	Yes		
Ailsa Craig	439.3	Common guillemot	No	Yes	35

SPA	DISTANCE TO PROJECT (KM)	QUALIFYING INTEREST/FEATURES	PROJECT WITHIN FORAGING RANGE	POTENTIAL FOR CONNECTIVITY	ID
		Gannet	Yes		
		Herring gull	No		
		Kittiwake	No		
		Lesser black-backed gull	No		
		Seabird assemblage	Yes		
Rathlin Island	457.9	Fulmar	Yes	Yes	36
		Common guillemot	No		
		Kittiwake	No		
		Razorbill	No		
REPUBLIC OF IRELAND					
Horn Head to Fanad Head	504.1	Fulmar	Yes	Yes	37
Tory Island	523.6	Fulmar	Yes	Yes	38
West Donegal Coast	541.5	Fulmar	Yes	Yes	39
Lambay Island	639.0	Fulmar	Yes	Yes	40
Duvillaun Islands	696.8	Fulmar	Yes	Yes	41
Clare Island	714.7	Fulmar	Yes	Yes	42
High Island, Inishshark and Davillaun	737.7	Fulmar	Yes	Yes	43
Cliffs of Moher	772.1	Fulmar	Yes	Yes	44
Saltee Islands	789.3	Fulmar	Yes	Yes	45
Kerry Head	832.1	Fulmar	Yes	Yes	46
Dingle Peninsula	858.4	Fulmar	Yes	Yes	47
Iveragh Peninsula	880.6	Fulmar	Yes	Yes	48
Blasket Islands	889.3	Fulmar	Yes	Yes	49
		Manx shearwater	Yes		
Puffin Island	912.7	Fulmar	Yes	Yes	50
		Manx shearwater	Yes		
Beara Peninsula	913.4	Fulmar	Yes	Yes	51
Deenish Island and Scariff Island	916.6	Fulmar	Yes	Yes	52
		Manx shearwater	Yes		

SPA	DISTANCE TO PROJECT (KM)	QUALIFYING INTEREST/FEATURES	PROJECT WITHIN FORAGING RANGE	POTENTIAL FOR CONNECTIVITY	ID
Skelligs	921.6	Fulmar	Yes	Yes	53
		Manx shearwater	Yes		

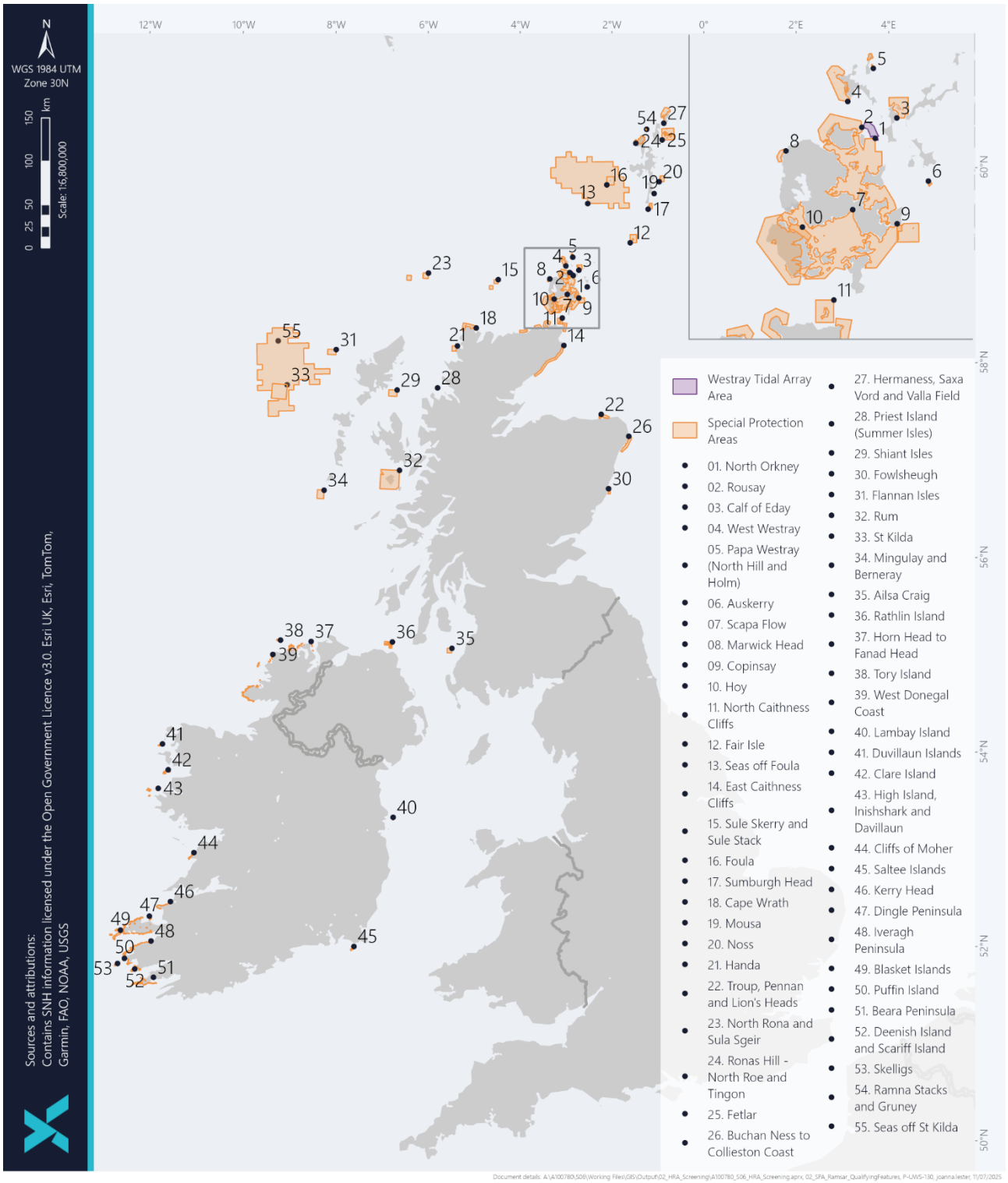

Figure 7-1 - European sites (SPAs) designated for ornithological features with connectivity. Sites with no potential for connectivity are not shown.

7.2.2.2 Non-breeding birds

During the non-breeding season, when species are not spatially restricted by breeding constraints, determining connectivity is conducted in accordance with NatureScot Guidance Note 4 (NatureScot, 2023b) and advice set out in the Orbital Scoping Opinion (MD-LOT, 2024). This includes non-breeding seabirds that are qualifying features of the marine SPAs and breeding seabirds from SPA colonies during the non-breeding season.

For marine SPAs with wintering gulls as qualifying features, NatureScot advise to establish connectivity using the breeding foraging ranges as per Woodward *et al.* (2019) (Table 7-2), with the exception of little gull where a 15 km range is advised (NatureScot, 2023b). For non-breeding seabird qualifying features of marine SPAs, connectivity is established using a 15 km range to inform the inclusion of marine SPA qualifying features. These sites are also included within Table 7-3 above to establish connectivity to breeding seabird colonies (Table 7-4).

For breeding seabirds from colony SPAs during the non-breeding season, there is the potential for connectivity as seabird species are not constrained to colonies and are more widely distributed. It is not possible to make a general assumption that there will be no potential LSE on all species within an SPA area. It can be predicted that lower densities of the species will be present during this period and lower apportioning values would be more appropriate to use.

For all inshore wintering waterfowl qualifying features of marine SPAs, connectivity is considered within 15 km of the SPA.

Table 7-4 Non-breeding seabird SPAs that may have connectivity to the Project, with the ID relating to that illustrated in Figure 7-1

SPA	DISTANCE TO PROJECT (KM)	RELEVANT QUALIFYING FEATURE	POTENTIAL FOR CONNECTIVITY	ID
North Orkney (marine SPA)	<1	Great northern diver Slavonian grebe Velvet scoter	Yes	1
Scapa Flow (marine SPA)	21.8	European shag Black-throated diver Great northern diver Slavonian grebe Common eider Long-tailed duck Red-breasted merganser	No	7
Seas off Foula (marine SPA)	78.7	Fulmar Great skua Guillemot Seabird assemblage	No	13

7.2.2.3 Terrestrial birds (including waterbirds)

The movement of migratory waders, wildfowl, raptors and passerines is characterised by long distance flights, which occur as a series of flights between discrete staging areas. Migrations typically occur across broad fronts at high altitudes when flying long distances, but when birds such as waders and wildfowl encounter unfavourable weather, are in sight of land or are flying relatively short distances, it is likely that they will descend to lower heights following landscape features such as coastlines until they reach suitable staging areas. Migratory waders and wildfowl have been considered in Section 7.2.2.2. Table 7-5 lists SPAs with terrestrial birds with potential connectivity to the Project.

Table 7-5 Terrestrial SPAs that may have connectivity to the Project

SPA	DISTANCE TO PROJECT (KM)	RELEVANT QUALIFYING FEATURE	POTENTIAL FOR CONNECTIVITY
Orkney Mainland Moors	14.1	Hen harrier, breeding and non-breeding	No – terrestrial species
		Short-eared owl, breeding	No - terrestrial species

7.2.3 Long List of European Sites Designated for Ornithological Features with Potential Connectivity to the Project

Based on the criteria outlined in section 7.1, the SPAs for which there is potential connectivity with the Project are shown in Figure 7-1. The sites for which there is connectivity will be taken forward for consideration of LSEs. Furthermore, the sensitivity of species to tidal projects have also been considered further using Furness *et al.* (2012). The key offshore species present in the area which have an increased sensitivity to tidal turbines includes:

- European shag (*Phalacrocorax Aristotelis*);
- Great cormorant (*Phalacrocorax carbo*);
- Common guillemot (*Uria aalge*);
- Razorbill (*Alca torda*);
- Black guillemot (*Cepphus grylle*);
- Atlantic puffin (*Fratercula arctica*); and
- Red-throated diver (*Gavia stellata*).

7.3 Determination of Potential LSE

A number of potential pathways for LSE on qualifying features of SPAs with potential connectivity with the Project have been identified. The potential LSE pathways share some commonalities with windfarms, however, due the nature of tidal turbines some of the potential pathways for LSE differ. The potential pathways which have been identified to have a LSE from the construction, operation and maintenance, and decommissioning stages of the Project includes:

- Construction and decommissioning:

  - Disturbance and/or displacement;
  - Attraction to marine structures;
  - Impacts from artificial lighting; and
  - Indirect impacts on birds due to changes in prey availability.
- Operation and maintenance:
  - Disturbance and/or displacement;
  - Collision with tidal devices;
  - Attraction to marine structures;
  - Impacts from artificial lighting; and
  - Indirect impacts on birds due to changes in prey availability.

7.3.1 Construction and Decommissioning

7.3.1.1 Disturbance and/or displacement

During the construction and decommissioning phase there is a potential for disturbance and/or displacement to bird species which use the marine and intertidal habitats leading to displacement of birds from the Project area. This would effectively result in temporary habitat loss through a reduction in the area available for foraging, loafing and moulting. It is predicted for these potential impacts to be highly localised and temporary, especially in the context of the wide areas available for birds. Disturbance impacts during construction and decommissioning may occur as a result of increased vessel activity both in the Project area, as well as during movements between ports and the Project area or temporary anchorages, which includes visual disturbance, noise and movement which would be short-term and reversible once construction vessels leave the area. Additionally, the presence of partially constructed structure (i.e. tidal devices) may displace birds from feeding and resting areas.

Bird species with a higher sensitivity to disturbance include diving species which forage for fish and shellfish such as auk species, divers (e.g. red-throated diver), cormorant, and seaduck species. In particular, these species are considered to have moderate vulnerability to visual and noise disturbance from vessels and other Project activities (Furness *et al.*, 2012). Disturbance of these species has potential to cause displacement from marine habitat and affect birds' time and energy budgets. Common guillemot and razorbill with attendant dependent young (June - August) have additional vulnerability due to the responsibility of caring for their young.

Gull and tern species are not considered highly vulnerable to construction noise as they feed at the surface only. These species have been recorded to show no obvious responses to construction activity such as piling (Leopold and Camphuysen, 2007) and are considered low risk for any potential noise impacts from the Project.

Designated sites which have waterfowl as qualifying features and lie outside of the Project boundary are not considered to be vulnerable to disturbance and/or displacement during the construction and decommissioning phases, as these features are not anticipated to utilise habitat in the marine environment for foraging.

7.3.1.2 Attraction to marine structures

The tidal stream devices and other installed Project infrastructure may cause attraction, potentially providing birds new perching and feeding opportunities and thereby may attract some species. This is especially the case for devices

that float or have with surface piercing elements. Subsurface infrastructure including device bottom foundations may provide artificial reef habitat and be attractive to fish which are the prey of birds. Attraction in this way is akin to habitat enhancement and therefore is potentially beneficial to birds.

7.3.1.3 Impacts from artificial lighting

As per NatureScot advice received in the Orbital Westray Scoping Opinion (MD-LOT, 2024), impacts from artificial lighting from high-intensity work lights on construction vessels have been scoped in for further consideration. As nocturnal species, petrels and shearwaters are vulnerable to the effects of lighting as they may be attracted to the light, especially in misty conditions. It is not clear to what extent the grounding of storm-petrels on vessels results from light attraction, or whether they are attracted to vessels by other cues (such as low frequency sounds or visual cues associated with a food source) (Scottish government, 2022). Petrels and shearwaters that get attracted to artificial lights may subsequently get disorientated and ground, increasing risk of collision with vessels and influence survival in the longer term from wasted energy expenditure. Prolonged periods of flights may lead to dehydration and exhaustion.

Fledgling storm petrels from breeding colonies within 10 km of light sources are at particular risk (Troy *et al.*, 2013), where fledglings have shown to be attracted back to colonies after reaching the sea from distances up to 10 km from the coastline. Rodríguez *et al.* (2015, 2022) have shown that grounded fledglings were found within 16 km of their breeding colonies, with 50% within 3 km of their nest site. However, studies on Leach's and European Storm-Petrels on St Kilda have shown that the number of grounded fledglings is very small in relation to the size of the breeding population (<<1% of the number of young likely to fledge annually) (Miles *et al.*, 2010). This finding suggests that fledglings are not susceptible to attraction to light sources from a long range, however level of illumination was relatively low. The closest colony to the Project is the Auskerry SPA located 19.1 km away.

7.3.1.4 Indirect effects due to prey availability

Indirect impacts to birds may occur during the construction stage if there are effects on prey species and/or the habitats of prey species. These indirect impacts occur as a result of underwater noise during construction and the generation of suspended sediments, which may alter the behaviour or availability of prey species.

During the non-breeding period the potential foraging area for displaced seabirds is likely to be greater than during the breeding season and displaced birds that feed on widely occurring fish species will be able to relocate to other suitable foraging areas within their normal range of distribution at this time.

Designated sites which have waterfowl as qualifying features and lie outside of the Project boundary are not considered to be vulnerable to this impact during the construction and decommissioning phases, as these features are not anticipated to utilise habitat in the marine environment for foraging.

7.3.2 Operation and maintenance

7.3.2.1 Disturbance and/or displacement

The presence of tidal turbines may result in disturbance to birds. The sensitivity of species varies and studies have highlighted that displacement is only likely to occur in the operating area of the tidal turbines or from the maintenance vessels (McCluskie *et al.*, 2012). It is predicted for these potential impacts to be highly localised and temporary. Disturbance and/or displacement may occur as a result of increased vessel activity both in the Project area, as well as during movements between ports and the Project area, which includes visual disturbance, noise and movement which would be short-term and reversible once vessels leave the area. This has the potential to disturb sensitive species outside the Project site and seabirds outside their SPA breeding colonies. Additionally, the presence of partially constructed structure (i.e. tidal devices) may displace birds from feeding and resting areas.

Diver and auk species may avoid tidal devices by up to a few hundred metres from the vicinity of surface-piercing marine fixed-structures, leading to displacement and effectively depriving them of marine habitat. Species diving to depth for foraging, such as gannet, cormorant, shag, and seaducks, may also be displaced from foraging habitat as a result of the presence infrastructure.

7.3.2.2 Collision with tidal devices

There is a potential risk of collision with the tidal turbine rotors and associated infrastructure which may result in injury or fatality to birds within the Project area. These risks will be associated with diving birds during feeding behaviours. This is particularly the case for diving species which forage deeper than 5 m below the sea surface, i.e., auk, diver, cormorant and seaduck species, and gannet, where Furness *et al.*, 2012 indicates these species have potential vulnerability to collision with tidal stream devices.

Collision risk is sensitive to device operating depth and seabed depth, and the amount of time a bird spends at depth. Common guillemot has particularly high vulnerability. Shag, black guillemot and eider, have high vulnerability where seabed depth is <30 m. The risk of collision with tidal turbines is influenced by a variety of factors such as, avoidance rate, turbine location and size. It is noted that more information specific to bird tidal turbines avoidance rates is required but highlight similarities to collision risk modelling in wind turbines (Wilson *et al.*, 2006; Cook *et al.*, 2018).

7.3.2.3 Attraction to marine structures

Attraction is the opposite of displacement. The tidal stream devices and other installed Project infrastructure potentially provide birds new perching and feeding opportunities and thereby may attract some species. This is especially the case for devices that float or have with surface piercing elements. Subsurface infrastructure including device bottom foundations may provide artificial reef habitat and be attractive to fish which are the prey of birds. Attraction in this way is akin to habitat enhancement and therefore is potentially beneficial to birds. Attraction could have a negative side effect if it increased bird activity in the close vicinity of turbines as this could increase collision risk.

7.3.2.4 Impacts from artificial lighting

As described in Section 7.3.1.3, petrels and shearwaters are vulnerable to the effects of lighting as they may be attracted to the light, especially in misty conditions. During the operation and maintenance phase, Project activities may require the use of bright lighting which may have an effect on petrels and shearwaters.

Designated sites which have waterfowl as qualifying features and lie outside of the Project boundary are not considered to be vulnerable to bright lighting during the operation and maintenance phase.

7.3.2.5 Indirect effects due to prey availability

The creation of artificial reef habitat may lead to localised increases in some prey fish species. Although such increases in prey availability could be positive for birds, it could also be negative if it increased turbine collision risk through attraction.

7.3.3 Summary of the Determination of Potential LSE

The determination of LSE for European sites is set out in Table 7-6. For all sites, it is considered that the potential pathways for LSE are consistently as follows for varying species:

- Disturbance and/or displacement (Construction, Operation and Maintenance, Decommissioning);
- Impacts from artificial lighting (Construction, Operation and Maintenance, Decommissioning);
- Indirect effects to prey (Construction, Operation and Maintenance, Decommissioning)
- Collision with tidal devices (Operation and Maintenance);
- Attraction to marine structures (Operation and Maintenance); and
- Displacement (Operation and Maintenance).

Table 7-6 Determination of potential LSE for SPAs designated for ornithological features

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
North Orkney (marine SPA)	1	<1	Great northern diver, non-breeding Red-throated diver, breeding Slavonian grebe, non-breeding Velvet scoter, non-breeding	Potential LSE cannot be ruled out for all qualifying features.	The close proximity of this SPA to the Project and the potential connectively and the vulnerability of designated species within this SPA, means potential for LSE cannot be ruled out for all Project phases and species.
Rousay	2	<1	Arctic skua, breeding Fulmar, breeding Kittiwake, breeding Arctic tern, breeding Common guillemot, breeding Seabird Assemblage, breeding	Potential LSE cannot be ruled out for all qualifying features.	The close proximity of this SPA to the Project and the potential connectively and the vulnerability of designated species within this SPA, means potential for LSE cannot be ruled out for all Project phases and species.
Calf of Eday	3	7.2	Fulmar, breeding Kittiwake, breeding Great black-backed gull, breeding Cormorant, breeding Common guillemot, breeding	Potential LSE cannot be ruled out for cormorant and guillemot.	There is a potential collision risk for breeding cormorant and guillemot.
				No potential for LSE concluded for	Fulmar, kittiwake, great black-backed gull and seabird assemblages have very low vulnerability to collision.

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
			Seabird Assemblage, breeding	fulmar, kittiwake, great black-backed gull, and breeding bird assemblage.	There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of these species. Fulmar, kittiwake, great black-backed gull and seabird assemblages have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
West Westray	4	8.0	Arctic tern, breeding Fulmar, breeding Kittiwake, breeding Common guillemot, breeding Razorbill, breeding Seabird assemblage, breeding	Potential LSE cannot be ruled out for guillemot and razorbill.	There is a potential collision risk for breeding guillemot and razorbill.
				No potential for LSE concluded for Arctic tern, fulmar, kittiwake, and seabird assemblage.	Arctic tern, fulmar, kittiwake and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of these species. Arctic tern, fulmar, kittiwake and seabird assemblages have very low vulnerability to impacts from artificial lighting.

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
					Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
Papa Westray (North Hill and Holm)	5	16.0	Arctic tern, breeding	No potential for LSE concluded for Arctic tern.	Arctic tern have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey. Arctic tern have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
Auskerry	6	19.1	Arctic tern, breeding European storm petrel, breeding	No potential for LSE concluded for Arctic tern and European storm petrel.	Arctic tern and European storm petrel have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of these species. Arctic tern have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests. European storm petrel are vulnerable to impacts from artificial lighting, however based on the distance between the SPA and the Project, there is low potential

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
					for artificial lighting to undermine the conservation objectives of the qualifying interest.
				Potential LSE cannot be ruled out for common guillemot.	There is a potential collision risk for breeding guillemot.
Marwick Head	8	23.9	Kittiwake, breeding Common guillemot, breeding Seabird Assemblage, breeding	No potential for LSE concluded for kittiwake and seabird assemblage.	Kittiwake and seabird assemblage have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Kittiwake and seabird assemblages have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
Copinsay	9	25.4	Fulmar, breeding Great black-backed gull, breeding Kittiwake, breeding, breeding Common guillemot, breeding	No potential for LSE concluded for fulmar, kittiwake, great black-backed gull, and seabird assemblage.	Fulmar, great black-backed gull, kittiwake and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar, great black-backed gull, kittiwake and seabird

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
			Seabird Assemblage, breeding		assemblages have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
				Potential LSE cannot be ruled out for common guillemot.	There is a potential collision risk for breeding guillemot.
Hoy	10	33.4	Fulmar, breeding Great black-backed gull, breeding Kittiwake, breeding Great skua, breeding Common guillemot, breeding Puffin, breeding Seabird Assemblage, breeding	No potential for LSE concluded for fulmar, great black-backed gull, kittiwake, great skua, and seabird assemblage.	Fulmar, great black-backed gull, kittiwake, great skua, and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar, great black-backed gull, kittiwake, great skua, and seabird assemblages have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
				Potential LSE cannot be ruled out for guillemot and puffin.	There is a potential collision risk for breeding guillemot and puffin.

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
North Caithness Cliffs	11	49.0	Fulmar, breeding Kittiwake, breeding Common guillemot, breeding Puffin, breeding Razorbill, breeding Seabird Assemblage, breeding	No potential for LSE concluded for fulmar, kittiwake, and seabird assemblages.	Fulmar, kittiwake, and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar, kittiwake, and seabird assemblages have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
				Potential LSE cannot be ruled out for guillemot, puffin and razorbill.	There is a potential collision risk for breeding guillemot, puffin and razorbill.
Fair Isle	12	72.7	Fulmar, breeding Kittiwake, breeding Great skua, breeding Common guillemot, breeding Gannet, breeding Puffin, breeding Razorbill, breeding Seabird assemblage, breeding	No potential for LSE concluded for fulmar, kittiwake, great skua, and seabird assemblages.	Fulmar, kittiwake, great skua, and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar, kittiwake, great skua and seabird assemblages have very low vulnerability to impacts from artificial lighting.

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
					Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
				Potential LSE cannot be ruled out for guillemot, gannet, puffin, and razorbill.	There is a potential collision risk for breeding guillemot, gannet, puffin, and razorbill.
Seas off Foula (marine SPA)	13	78.7	Fulmar, breeding and non-breeding Great skua, breeding and non-breeding Guillemot, breeding and non-breeding Puffin, breeding Seabird assemblage, breeding and non-breeding	No potential for LSE concluded for fulmar, kittiwake, great skua, guillemot, puffin and seabird assemblages.	The Seas off St Foula SPA lies approximately 79 km from the Project and was established as one of a number of marine SPAs to help conserve important marine areas for seabirds, to avoid significant deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species. Due to the limited spatial extent of all impact pathways associated with the Project, and the intervening distance to the SPA, the Project will not undermine the conservation objectives of the qualifying interests
East Caithness Cliffs	14	78.9	Fulmar, breeding Herring gull, breeding Kittiwake, breeding Common guillemot, breeding Razorbill, breeding Seabird assemblage, breeding	No potential for LSE concluded for fulmar, herring gull, kittiwake, and seabird assemblages.	Fulmar, herring gull, kittiwake, and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar, herring gull, kittiwake, and seabird assemblages have very low vulnerability to impacts from artificial lighting.

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
					Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
				Potential LSE cannot be ruled out for guillemot and razorbill.	There is a potential collision risk for breeding guillemot and razorbill.
Sule Skerry and Sule Stack	15	81.3	Common guillemot, breeding Gannet, breeding Puffin, breeding Leach's storm petrel, breeding European storm petrel, breeding Seabird Assemblage, breeding	Potential LSE cannot be ruled out for guillemot, gannet, puffin, and razorbill.	There is a potential collision risk for breeding guillemot, gannet, puffin, and razorbill.
				No potential for LSE concluded for Leach's storm petrel and European storm petrel.	Considering the distance of the SPA to the Project, there is low potential for artificial lighting to undermine the conservation objectives of the qualifying interests. European storm petrel and Leach's storm petrel have very low vulnerability to disturbance or collision.
				No potential for LSE concluded for seabird assemblage.	There is a very low potential for disturbance to the seabird assemblage and low potential for displacement, attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the species of concern. Disturbance will be highly localised and temporary. Seabird assemblages have very low vulnerability to impacts from artificial lighting.

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
					Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
Foula	16	105.4	Fulmar, breeding Kittiwake, breeding Great skua, breeding Leach's petrel, breeding Common guillemot, breeding Puffin, breeding Razorbill, breeding European shag, breeding Seabird assemblage, breeding	Potential LSE cannot be ruled out for guillemot, puffin, razorbill and European shag.	There is a potential collision risk for breeding guillemot, puffin, razorbill and European shag.
				No potential for LSE concluded for Leach's storm petrel and European storm petrel.	Considering the distance of the SPA to the Project, there is low potential for artificial lighting to undermine the conservation objectives of the qualifying interests. European storm petrel and Leach's storm petrel have very low vulnerability to disturbance or collision.
				No potential for LSE concluded for Fulmar, kittiwake, great skua and seabird assemblage.	Fulmar, kittiwake, great skua and the seabird assemblage have very low vulnerability to collision. There is also a very low potential for disturbance and low potential for displacement, attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the species of concern. Disturbance will be highly localised and temporary. Fulmar, kittiwake, great skua and the seabird assemblage all have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
Sumburgh Head	17	110.9	Fulmar, breeding Kittiwake, breeding Common guillemot, breeding Seabird assemblage, breeding	No potential for LSE concluded for fulmar, kittiwake and seabird assemblage.	Fulmar, kittiwake and seabird assemblage have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar, kittiwake, and seabird assemblages have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
				Potential LSE cannot be ruled out for guillemot.	There is a potential collision risk for breeding guillemot.
Cape Wrath	18	122.6	Fulmar, breeding Kittiwake, breeding Puffin, breeding Seabird assemblage, breeding	No potential for LSE concluded for fulmar, kittiwake, and seabird assemblages.	Fulmar, kittiwake, and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar, kittiwake, and seabird assemblages have very low vulnerability to impacts from artificial lighting.

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
					Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
				Potential LSE cannot be ruled out for puffin.	There is a potential collision risk for puffin.
Mousa	19	127.6	European storm petrel, breeding	No potential for LSE concluded for European storm petrel.	Considering the distance of the SPA to the Project, there is low potential for artificial lighting to undermine the conservation objectives of the qualifying interests. European storm petrel have very low vulnerability to disturbance or collision.
Noss	20	141.2	Fulmar, breeding Kittiwake, breeding Great skua, breeding Common guillemot, breeding Gannet, breeding Puffin, breeding Seabird Assemblage, breeding	No potential for LSE concluded for fulmar, kittiwake, great skua and seabird assemblages.	Fulmar, kittiwake, great skua and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar, kittiwake, great skua, and seabird assemblages have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
				Potential LSE cannot be ruled out for	There is a potential collision risk for breeding guillemot, gannet and puffin.

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
				guillemot, gannet and puffin.	
Handa	21	151.3	Fulmar, breeding Kittiwake, breeding Great skua, breeding Seabird Assemblage, breeding	No potential for LSE concluded for fulmar, kittiwake, great skua and seabird assemblages.	Fulmar, kittiwake, great skua and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar, kittiwake, great skua, and seabird assemblages have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
Troup, Pennan and Lion's Heads	22	158.6	Fulmar, breeding Kittiwake, breeding Seabird assemblage, breeding	No potential for LSE concluded.	Fulmar, kittiwake and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar, kittiwake, and seabird assemblages have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
North Rona and Sula Sgeir	23	159.5	Fulmar, breeding Kittiwake, breeding Leach's petrel, breeding European storm petrel, breeding Gannet, breeding Puffin, breeding Seabird Assemblage, breeding	No potential for LSE concluded for fulmar, kittiwake, and seabird assemblages.	Fulmar, kittiwake and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar, kittiwake, and seabird assemblages have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
				No potential for LSE concluded for Leach's storm petrel and European storm petrel.	Considering the distance of the SPA to the Project, there is low potential for artificial lighting to undermine the conservation objectives of the qualifying interests. European storm petrel and Leach's storm petrel have very low vulnerability to disturbance or collision.
				Potential LSE cannot be ruled out for gannet and puffin.	There is a potential collision risk for gannet and puffin.
Ronas Hill - North Roe and Tingon	24	161.7	Great skua, breeding	No potential for LSE concluded for great skua.	Great skua have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species.

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
					Great skua have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
Fetlar	25	180.0	Fulmar, breeding Great skua, breeding Seabird Assemblage, breeding	No potential for LSE concluded for fulmar, great skua and seabird assemblages.	Fulmar, great skua and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar, great skua, and seabird assemblages have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
Ramna Stacks and Gruney	54	180.6	Leach's petrel, breeding	No potential for LSE concluded for Leach's petrel.	Considering the distance of the SPA to the Project, there is low potential for artificial lighting to undermine the conservation objectives of the qualifying interests. Leach's petrel have very low vulnerability to disturbance or collision.
Buchan Ness to Collieston Coast	26	190.5	Fulmar, breeding Kittiwake, breeding Seabird Assemblage, breeding	No potential for LSE concluded for all qualifying features.	Fulmar, kittiwake and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
					potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar, kittiwake, and seabird assemblages have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
Hermaness, Saxa Vord and Valla Field	27	197.2	Fulmar, breeding Kittiwake, breeding Great skua, breeding Gannet, breeding Puffin, breeding Seabird assemblage, breeding	No potential for LSE concluded for fulmar, kittiwake, great skua and seabird assemblages.	Fulmar, kittiwake, great skua and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar, kittiwake, great skua, and seabird assemblages have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
				Potential LSE cannot be ruled out for gannet and puffin.	There is a potential collision risk for gannet and puffin.
Priest Island (Summer Isles)	28	197.3	European storm petrel, breeding	No potential for LSE concluded for	Considering the distance of the SPA to the Project, there is low potential for artificial lighting to undermine the conservation objectives of the qualifying interests.

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
				European storm petrel.	European storm petrel have very low vulnerability to disturbance or collision.
Shiant Isles	29	235.0	Fulmar, breeding Kittiwake, breeding Puffin, breeding Seabird assemblage, breeding	No potential for LSE concluded for fulmar, kittiwake and seabird assemblages.	Fulmar, kittiwake and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar, kittiwake, and seabird assemblages have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
				Potential LSE cannot be ruled out for puffin.	There is a potential collision risk for breeding puffin.
Fowlsheugh	30	242.2	Fulmar, breeding Kittiwake, breeding Seabird assemblage, breeding	No potential for LSE concluded for all qualifying interests.	Fulmar, kittiwake and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar, kittiwake, and seabird assemblages have very low vulnerability to impacts from artificial lighting.

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
					Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
Flannan Isles	31	276.9	Fulmar, breeding Kittiwake, breeding Leach's storm petrel, breeding Seabird assemblage, breeding	No potential for LSE concluded for fulmar, kittiwake and seabird assemblages.	Fulmar, kittiwake and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar, kittiwake, and seabird assemblages have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
				No potential for LSE concluded for European storm petrel.	Considering the distance of the SPA to the Project, there is low potential for artificial lighting to undermine the conservation objectives of the qualifying interests. European storm petrel have very low vulnerability to disturbance or collision.
Seas off St Kilda (marine SPA)	55	290.7	Fulmar, breeding Gannet, breeding European storm petrel, breeding Seabird assemblage, breeding	No potential for LSE concluded for fulmar, gannet, European storm petrel and seabird assemblages.	The Seas off St Kilda SPA lies 290 km from the Project and was established as one of a number marine SPAs to help conserve important marine areas for seabirds, to avoid significant deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species.

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
					Due to the limited spatial extent of all impact pathways associated with the Project, and the intervening distance to the SPA, the Project will not undermine the conservation objectives of all qualifying interests.
Rum	32	292.6	Kittiwake, breeding Manx shearwater, breeding Seabird assemblage, breeding	No potential for LSE concluded for kittiwake, Manx shearwater and seabird assemblages.	Kittiwake, Manx shearwater and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Kittiwake and seabird assemblages have very low vulnerability to impacts from artificial lighting. Considering the distance of the SPA to the Project, there is low potential for artificial lighting to undermine the conservation objectives of Manx shearwater as a designated feature. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
St Kilda	33	342.0	Fulmar, breeding Great skua, breeding Leach's petrel, breeding Manx shearwater, breeding Gannet, breeding	No potential for LSE concluded for kittiwake, great skua, and seabird assemblages.	Fulmar, great skua and seabird assemblages have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
			Seabird assemblage, breeding		the designated species. Fulmar, great skua, and seabird assemblages have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
				Potential LSE cannot be ruled out for gannet.	There is a potential collision risk for breeding gannet.
				No potential for LSE concluded for Leach's petrel and Manx shearwater.	Considering the distance of the SPA to the Project, there is low potential for artificial lighting to undermine the conservation objectives of the qualifying interests. Leach's petrel and Manx shearwater have very low vulnerability to disturbance or collision. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species.
Mingulay and Berneray	34	368.4	Fulmar, breeding Seabird assemblage, breeding	No potential for LSE concluded.	Fulmar and seabird assemblage have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar and seabird assemblages have very low vulnerability to impacts from artificial lighting.

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
					Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
Ailsa Craig	35	439.3	Gannet, breeding	Potential LSE cannot be ruled out for gannet.	There is a potential collision risk for breeding gannet.
			Seabird assemblage, breeding	No potential for LSE concluded for seabird assemblage.	Seabird assemblage have very low vulnerability to collision. There is a very low potential for disturbance and/or displacement as it will be highly localised and temporary. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Seabird assemblages have very low vulnerability to impacts from artificial lighting. Therefore, the Project will not undermine the conservation objectives of the qualifying interests.
Rathlin Island	36	457.9	Fulmar, breeding	No potential for LSE concluded.	SPAs are located within the mean maximum plus one standard deviation foraging range for breeding fulmar. Fulmar has low vulnerability to disturbance and no vulnerability to collision. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar have very low vulnerability to impacts from artificial lighting.

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
Horn Head to Fanad Head	37	504.1	Fulmar, breeding	No potential for LSE concluded.	SPAs are located within the mean maximum plus one standard deviation foraging range for breeding fulmar and Manx shearwater. Fulmar and Manx shearwater have low vulnerability to disturbance and no vulnerability to collision. There is low potential for attraction to marine structures, and indirect effects to prey based on the large foraging ranges of the designated species. Fulmar have very low vulnerability to impacts from artificial lighting. Considering the distance of the SPA to the Project, there is low potential for artificial lighting to undermine the conservation objectives of Manx shearwater as a designated feature.
Tory Island	38	523.6	Fulmar, breeding		
West Donegal Coast	39	541.5	Fulmar, breeding		
Lambay Island	40	639.0	Fulmar, breeding		
Duvillaun Islands	41	696.8	Fulmar, breeding		
Clare Island	42	714.7	Fulmar, breeding		
High Island, Inishshark and Davillaun	43	737.7	Fulmar, breeding		
Cliffs of Moher	44	772.1	Fulmar, breeding		
Saltee Islands	45	789.3	Fulmar, breeding		
Kerry Head	46	832.1	Fulmar, breeding		
Dingle Peninsula	47	858.4	Fulmar, breeding		
Iveragh Peninsula	48	880.6	Fulmar, breeding		
Blasket Islands	49	889.3	Fulmar, breeding		
			Manx shearwater, breeding		
Puffin Island	50	912.7	Fulmar, breeding		
			Manx shearwater, breeding		

DESIGNATED SITE	ID	DISTANCE TO PROJECT	QUALIFYING INTEREST/FEATURE	CONCLUSION	JUSTIFICATION
Beara Peninsula	51	913.4	Fulmar, breeding		
Deenish Island and Scariff Island	52	916.6	Fulmar, breeding		
			Manx shearwater, breeding		
Skelligs	53	921.6	Fulmar, breeding		
			Manx shearwater, breeding		

8 IN-COMBINATION ASSESSMENT

8.1 Approach

This section outlines the approach to the identification of projects for in-combination assessment in the RIAA. The Habitats Regulations require consideration of potential effects on European sites from a project in-combination with other plans or projects. The in-combination assessment will consider projects that are:

- Under construction;
- Permitted applications(s), but not yet implemented;
- Submitted applications(s) which have not yet received a determination; and
- Any plan or project which is considered 'reasonably foreseeable' (i.e., a development for which there is sufficient design information in the public domain e.g. marine projects at Scoping stage).

Other offshore activities and industries to be considered include (but are not limited to):

- Marine renewables (offshore wind, wave and tidal, electrification);
- Coastal projects, for example port and harbour projects;
- Marine aggregate extraction, dredging and licensed disposal sites;
- Oil and gas activities;
- Carbon capture and storage; and
- Subsea cables and pipelines.

Identification of relevant in-combination projects, plans and activities for consideration within the HRA will follow the same approach as the EIA:

- Step 1: Compilation of the plans and project long list based on defined ZoI's for each receptor. The ZoI's provide the maximum search areas for other projects to be screened into the in-combination project long list. The long list will be developed based on the status of plans or projects up to an agreed 'cut off' date with stakeholders and will be provided to stakeholders for comment and agreement following this date. Operational projects will only be screened in if there is potential for an ongoing effect from that project type (e.g. bird collisions). For most receptors, operational projects will constitute part of the existing baseline and be considered within the Project specific effect assessment. These projects are therefore not considered within the in-combination effect assessment.
- Step 2: Compilation of the project short-list, taking into account potential pathways of effect (e.g. temporal and physical overlap of effects). Additional information collated for each project within the long list will be used to determine the potential for in-combination effects. This will take into consideration potential effect pathways and / or the potential for physical or temporal overlap of effects from other project activities and those of the Project. The most up-to-date publicly available information in relation to the relevant project parameters will be used to inform the in-combination assessment.

There is an inherent level of uncertainty with respect to the assessment of potential effects as some proposed projects may not be taken forward and built out as currently described. This uncertainty (which is typically correlated with the stage of development of a project) will be considered when drawing conclusions on in-combination effects.

8.2 Project Long List for In-combination Assessment (Step 1)

The features identified for which the potential for LSE has been concluded are presented below, with the associated sites and impact pathways summarised further in Section 9. The designated features for which there is the potential for LSE along with the foraging ranges, are used to inform the long list of projects for in-combination assessment.

- Marine mammals:
  - Harbour seal (50 km); and
  - Grey seal (20 km);
- Ornithology:
  - Red-throated diver (9 km);
  - Great northern diver (10 km)[9] ;
  - Slavonian grebe (10 km)[9];
  - European shag (23.7 km);
  - Cormorant (33.9 km);
  - Arctic tern (40.5 km);
  - Arctic skua (2.7 km);
  - Guillemot (153.7 km);
  - Razorbill (164.6 km);
  - Kittiwake (300.6 km)
  - Atlantic puffin (265.4 km); and
  - Gannet (509.4 km).

Based on the identified species, the largest foraging range relates to gannet, with just over 500 km, while the majority are under 50 km. Therefore, projects within 50 km of the Project area described in Section 8.2.1 below, with those over 50 km presented as a summary in Section 8.2.2.

The presented project lists are based on relevant projects up to the end of June 2025. It is proposed that a cut-off date will be agreed prior to the submission of the RIAA is applied in updating the project lists presented in the following section. Any additional projects to be considered in relation to the long list and its relevance to Step 2, will be presented within the RIAA. Step 2 in in terms of determining the project short-list and the potential for in-combination effects will be completed within the RIAA.

8.2.1 Projects up to 50 km from the Westray Tidal Array

The potential for an in-combination effect is most likely to be present associated with projects up to 50 km from the Project area, as most of the identified designated features have foraging ranges that are less than the applied distance. Identified projects proposed to be taken forward for further assessment within the RIAA are presented in Table 8-1. Up to 101 aquaculture sites occur within the 50 km from the Westray Tidal Array and comprise fin fish,

[9] *For these species, no foraging range is available, therefore, a nominal foraging distance of 10 km is applied in determining the project long list for in-combination assessment.*

shellfish and seaweed aquaculture facilities, with the closet being 5 km away. However, all of these sites are operational with no further information available on proposed sites, hence no aquaculture projects are listed in Table 8-1 for in-combination effects. All oil and gas infrastructure, pipelines, ports and harbours within 50 km are again all operational. Ports and harbours with planned major developments have been included.

Table 8-1 In-combination projects long list of projects that are up to 50 km from the Westray Tidal Array

			RELEVANT RECEPTOR	
PROJECT	STATUS	DISTANCE (KM)	MARINE MAMMALS	ORNITHOLOGY
MARINE RENEWABLES				
Fall of Warness	Application	0	✓	✓
Westray South	Agreement/ Option for Lease	0	✓	✓
Shapinsay Sound	Operational	15.7	✓	✓
Scapa Flow	Operational	27.8	✓	✓
Deerness Wave Energy Converter (WEC) test site	Operational	31.1	✓	✓
EMEC Bilia Croo	Operational	33.0	✓	✓
OFFSHORE WIND				
Ayre Offshore Wind Farm	Pre-application	37.7	✓	✓
ONSHORE WIND				
Costa Head	Consented	17.1	✓	✓
PORTS AND HARBOURS				
Faray extension	Application	2.7	✓	✓
Hatston Expansion	Pre-application	18.5	✓	✓
Scapa Deep Water Quay Development	Pre-application	25.2	✓	✓
Kirkwall Pier and Harbour Enhancements	Pre-application	17.4	✓	✓

8.2.2 Projects over 50 km from the Westray Tidal Array

For projects over 50 km, Table 8-2 summarises the projects for which there is the potential for in-combination effects on the designated features. For some project types, such as cables, oil and gas and ports and harbour, it is the case

that the potential for pathways only exists during the construction phase. As these types of projects are over 50 km from the Westray Tidal Array, a summary of the number of projects are provided in Table 8-2. A more detailed description of projects is provided for Marine Renewables and offshore wind, for which there are pathways for in-combination effects during multiple project phases. No aquaculture projects in a planning or pre-consent stage were identified in the applied search radius and are therefore not included in Table 8-2. The maximum foraging range for the marine mammals with the potential for LSE (grey seal and harbour seal) have a maximum foraging range of 50 km and therefore, the below long list only includes developments screened in for impacts to birds.

Table 8-2 In combination projects long list of projects that are over 50 km but within 500 km from the Westray Tidal Array

PROJECT	STATUS	DISTANCE (KM)
MARINE RENEWABLES		
Inner Sound	Operational	54.7
Yell Sound Array	Pre-consent	169.0
Bluemull Sound Tidal Array	Operation	194.0
Shetland Tidal Array	Operational	198.7
OFFSHORE WIND		
West of Orkney Offshore Wind Farm	Consented	64.4
Stromar Offshore Wind Farm	Pre-consent	68.7
Pentland Floating Offshore Wind Farm	Consented	84.3
Caledonia Offshore Wind Farm	Pre-consent	86.2
Beatrice Offshore Wind Farm	Operation	92.9
Moray Offshore Windfarm (East)	Operation	93.1
Buchan Offshore Wind Farm	Pre-consent	112.1
Broadshore Offshore Wind Farm	Pre-consent	113.0
Sinclair Offshore Wind Farm	Pre-consent	115.0
Scaraben	Pre-consent	120.0
Havbredey	Pre-consent	136.4
MarramWind	Pre-consent	150.0
Arven South	Pre-consent	163.6
Arven Offshore Wind Farm	Application	180.5
Green Volt	Pre-consent	176.3
Salamander	Pre-consent	187.6
Talisk Offshore Wind Project	Pre-consent	190.9
Flora Offshore Wind Farm	Pre-consent	201.7

PROJECT	STATUS	DISTANCE (KM)
Aspen Offshore Wind Farm	Pre-consent	203.3
Stoura Offshore Wind Farm	Pre-consent	201.0
Muir Mhor Offshore Wind Farm	Pre-consent	218.0
Aberdeen Offshore Wind Farm	Operational	212.0
Spiorad na Mara Offshore Wind Farm	Pre-consent	222.3
CampionWind	Pre-consent	236.3
Kincardine Offshore Wind Farm	Operation	235.7
Bowdun Offshore Wind Farm	Pre-consent	241.3
Morven Offshore Wind Farm	Pre-consent	263.2
Ossian Offshore Wind Farm	Pre-consent	271.2
Beech Offshore Wind Farm	Pre-consent	279.5
Seagreen Phase 1 Windfarm	Operation	273.1
Bellrock Offshore Wind Farm	Pre-consent	288.3
Cedar Offshore Wind Farm	Pre-consent	294.0
Inch Cape Offshore Wind Farm	Application	279.8
Marr Bank Wind Farm	Pre-consent	290.1
Berwick Bank Wind Farm	Pre-consent	298.5
Neart na Gaoithe Offshore WF	Pre-consent / consented	306.5
Culzean Offshore Wind Farm	Pre-consent / consented	343.0
Forthwind	Pre-consent / consented	323.4
Judy Floating Wind Farm	Pre-consent / consented	398.6
Connel	Decommissioning	327.1
MachairWind	Pre-consent / consented	390.6
Blyth Demonstration Phases 2&3	Pre-consent / consented	432.0
Blyth Demo Phase 1	Operational	441.0
Teesside Windfarm	Operational	497.0
ONSHORE WIND		
The closest onshore windfarm is the Armadale Wind Farm, located 94.4 km from the Project. **There are also a number of onshore wind farms within the ZoI for the assessed ecological receptors.**	Pre-consent and consented	94.4

9 SUMMARY

Table 9-1 below provides a summary of the European sites and their qualifying features for which no potential LSE cannot be concluded. Therefore, these European sites have been screened in for further assessment within the RIAA.

Table 9-1 European sites for which no potential LSE cannot be ruled out

DESIGNATED SITE	QUALIFYING FEATURE/ INTEREST	PROJECT STAGE	POTENTIAL PATHWAY FOR LSE
EUROPEAN SITES DESIGNATED FOR MARINE MAMMALS			
Sanday SAC	Harbour Seal	Construction and Decommissioning	• Disturbance and barrier effects on marine mammals and megafauna from underwater sound; • Disturbance at seal haul-out sites, including vessel movements to and from the site and port; and • Indirect impacts on marine mammals due to changes in prey availability.
		Operation	• Disturbance and barrier effects on marine mammals from underwater sound; • Disturbance at seal haul-out sites, including vessel movements to and from the site and port; • Marine mammal collision risk with operational devices; • Barrier effects to marine mammals from physical presence of devices; • Entanglement in mooring lines (direct) and ghost nets (secondary); and • Indirect impacts on marine mammals due to changes in prey availability.
Faray and Holm of Faray SAC	Grey seal	Construction and Decommissioning	• Disturbance and barrier effects on marine mammals and megafauna from underwater sound; • Disturbance at seal haul-out sites, including vessel movements to and from the site and port; and • Indirect impacts on marine mammals due to changes in prey availability.
		Operation	• Disturbance and barrier effects on marine mammals and megafauna from underwater sound; • Disturbance at seal haul-out sites, including vessel movements to and from the site and port; • Marine mammal collision risk with operational devices; • Barrier effects to marine mammals from physical presence of devices; • Entanglement in mooring lines and ghost nets; and

DESIGNATED SITE	QUALIFYING FEATURE/ INTEREST	PROJECT STAGE	POTENTIAL PATHWAY FOR LSE
			• Indirect impacts on marine mammals due to changes in prey availability.
EUROPEAN SITES DESIGNATED FOR ORNITHOLOGICAL FEATURES			
North Orkney (marine SPA)	• Great northern diver, non-breeding; • Red-throated diver, breeding; • Slavonian grebe, non-breeding; and • Velvet scoter, non-breeding.	Construction and Decommissioning	• Disturbance and/or displacement; • Artificial lighting; and • Indirect effects to prey.
		Operation and Maintenance	• Disturbance and/or displacement; • Artificial lighting; • Indirect effects to prey; • Collision with tidal devices; • Attraction to marine structures; and • Displacement.
Rousay	• Arctic skua, breeding; • Fulmar, breeding; • Kittiwake, breeding; • Arctic tern, breeding; • Common guillemot, breeding; and • Seabird Assemblage, breeding.	Construction and Decommissioning	• Disturbance and/or displacement; • Artificial lighting; and • Indirect effects to prey.
		Operation and Maintenance	• Disturbance and/or displacement; • Artificial lighting; • Indirect effects to prey; • Collision with tidal devices; • Attraction to marine structures; and • Displacement.
Calf of Eday	• Cormorant; and • Common guillemot.	Operation and Maintenance	• Collision with tidal devices.
West Westray	• Common guillemot; and • Razorbill.	Operation and Maintenance	• Collision with tidal devices.
Marwick Head	• Common guillemot.	Operation and Maintenance	• Collision with tidal devices.

DESIGNATED SITE	QUALIFYING FEATURE/ INTEREST	PROJECT STAGE	POTENTIAL PATHWAY FOR LSE
Copinsay	• Common guillemot.	Operation and Maintenance	• Collision with tidal devices.
Hoy	• Common guillemot; and • Puffin.	Operation and Maintenance	• Collision with tidal devices.
North Caithness Cliffs	• Common guillemot; • Puffin; and • Razorbill.	Operation and Maintenance	• Collision with tidal devices.
Fair Isle	• Guillemot; • Puffin; • Gannet; and • Razorbill.	Operation and Maintenance	• Collision with tidal devices.
East Caithness Cliffs	• Guillemot; and • Razorbill.	Operation and Maintenance	• Collision with tidal devices.
Sule Skerry and Sule Stack	• Guillemot; • Puffin; • Gannet; and • Razorbill.	Operation and Maintenance	• Collision with tidal devices.
Foula	• Guillemot; • Puffin; • European shag; and • Razorbill.	Operation and Maintenance	• Collision with tidal devices.
Sumburgh Head	• Guillemot.	Operation and Maintenance	• Collision with tidal devices.
Cape Wrath	• Puffin.	Operation and Maintenance	• Collision with tidal devices.
Noss	• Guillemot; • Gannet; and • Puffin.	Operation and Maintenance	• Collision with tidal devices.
North Rona and Sula Sgeir	• Guillemot; and • Puffin.	Operation and Maintenance	• Collision with tidal devices.
Hermanness, Saxa Vord and Valla Field	• Guillemot; and • Puffin.	Operation and Maintenance	• Collision with tidal devices.

DESIGNATED SITE	QUALIFYING FEATURE/ INTEREST	PROJECT STAGE	POTENTIAL PATHWAY FOR LSE
Shiant Isles	• Puffin	Operation and Maintenance	• Collision with tidal devices.
St Kilda	• Gannet	Operation and Maintenance	• Collision with tidal devices.
Ailsa Craig	• Gannet	Operation and Maintenance	• Collision with tidal devices.

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