


Havbredey Offshore Wind Farm

Offshore Scoping Report

1 April 2025

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Havbredey Offshore Wind Farm

Offshore Scoping Report


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Key Project Terms

Term	Definition
Applicant	Havbredey Limited (Company Number SC717714).
Array Area	The area as identified by the blue line boundary in Figure 1-1 in which the wind turbine generators (WTGs), associated moorings and anchors, the dynamic and static inter-array cables and offshore platform structures (as required) are located.
Landfall Area of Search	The area of the Offshore Cable Corridor Area of Search as identified by the green line boundary in Figure 1-2, that interacts with the coastline.
N2 Plan Option Area	Areas identified in the first Scotwind Leasing round by Crown Estate Scotland. For the Havbredey floating Offshore Wind Farm (OWF) this was 'N2'.
Offshore Cable Corridor Area of Search	An area of search in which the offshore export cable and reactive compensation stations (RCSs) (if required) are located between Array Area and Landfall Area of Search as identified by the red line boundary in Figure 1-1.
Offshore Project	The offshore elements of the Project.
Project	The full proposal for the Havbredey floating OWF, encompassing the Offshore Project and all onshore works.


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1. INTRODUCTION

1.1. BACKGROUND

In early 2022, as part of the ScotWind bidding round, Havbredey Limited ('the Applicant') was successfully awarded an Option Agreement to develop an offshore wind farm (OWF) within the N2 Plan Option Area located approximately 27 kilometres (km) offshore to the northwest of Cape Wrath. The proposed floating offshore wind farm (FLOW) is named 'Havbredey'; the Norse meaning of the name translates to 'Isles on the edge of the sea', inspired by Scottish and Nordic folklore.

This Offshore Scoping Report covers all offshore project components between the Array Area and Mean High Water Springs (MHWS). The offshore infrastructure includes the wind turbine generators (WTGs) and associated moorings and anchors, the dynamic and static inter-array cables, the offshore substation platform(s) (OSPs) and reactive compensation station(s) (RCSs) with associated foundations, and offshore export cables with associated cable protection where necessary.

The onshore project components (including onshore export cable corridor(s) and onshore substation) will be assessed in a separate scoping report (the 'Onshore Scoping Report') and Environmental Impact Assessment Report (EIAR) (the 'Onshore EIAR'), which will be produced once the ongoing Offshore Transmission Network Review (OTNR) and National Grid Holistic Network Design Follow Up (HNDfUE) Exercise review are delivered and outcomes known. Therefore, the onshore project components will not be discussed further within this Offshore Scoping Report.

As illustrated in Figure 1-1, the Offshore Project is split into the Array Area and the Offshore Cable Corridor Area of Search. As illustrated in Figure 1-2, the Landfall Area of Search is defined as the area of the Offshore Cable Corridor Area of Search that interacts with the coastline.

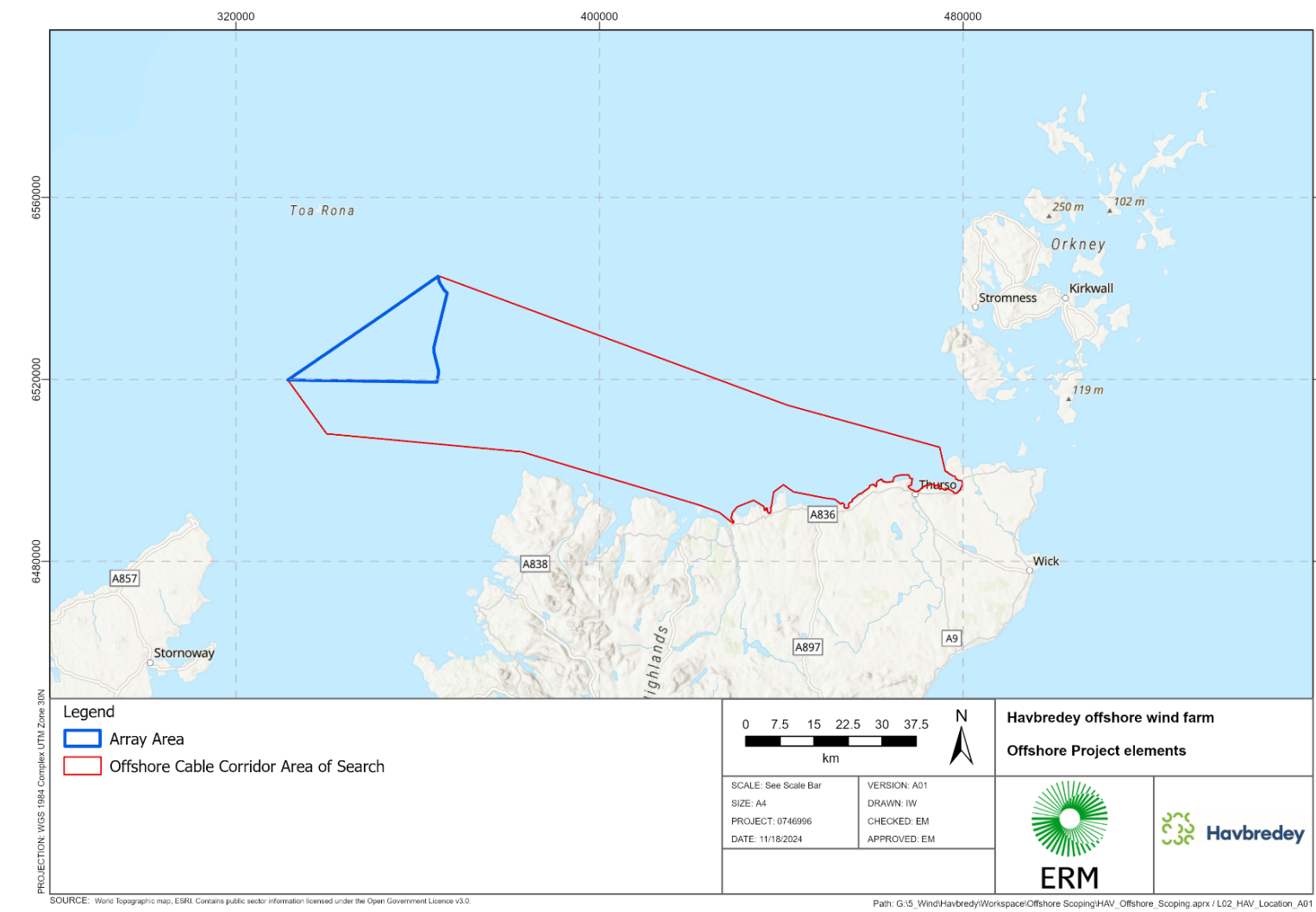


Figure 1-1 Project Overview

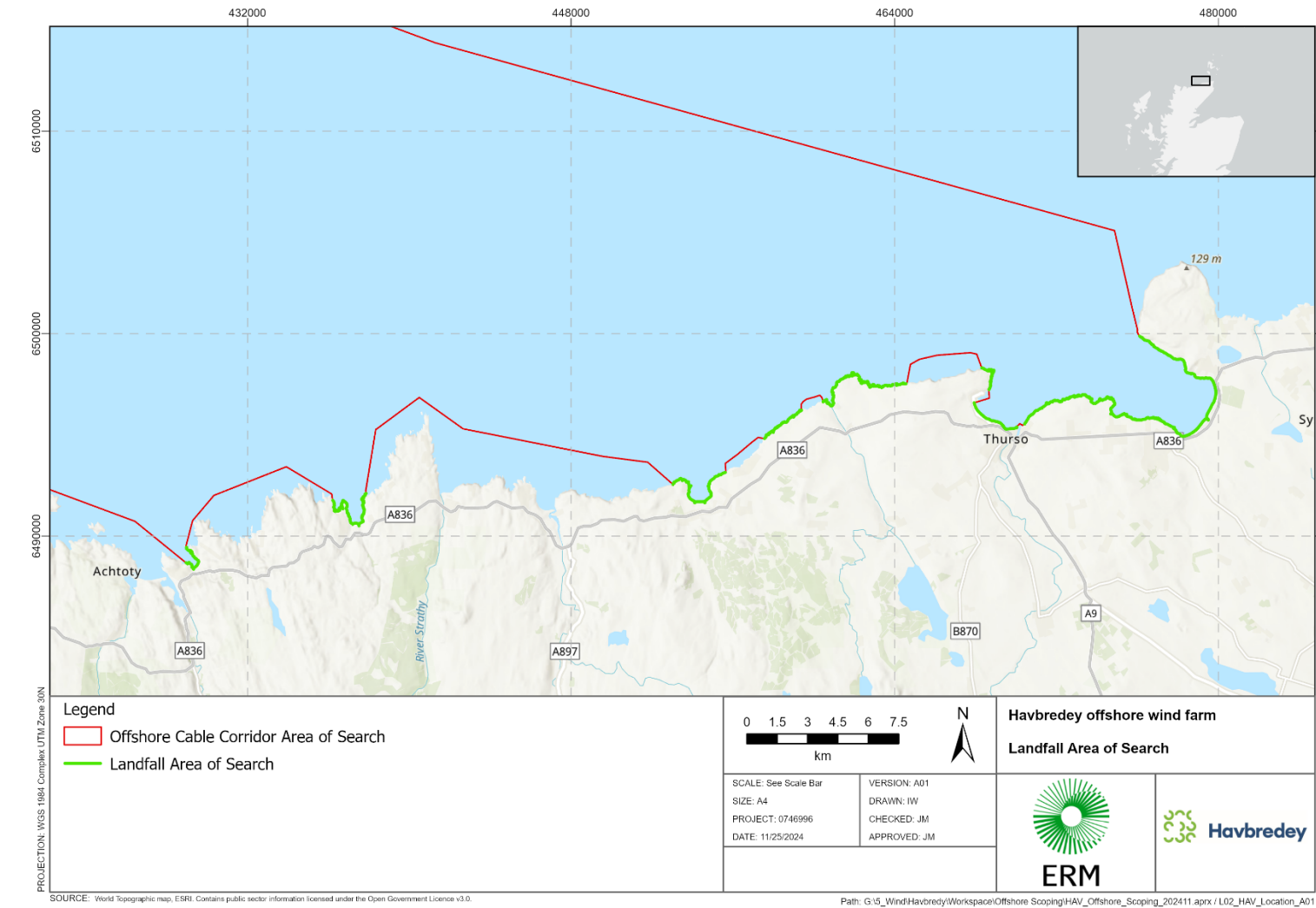



Figure 1-2 The Landfall Area of Search (The area of the Offshore Cable Corridor Area of Search that interacts with the coastline)

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1.2. THE APPLICANT

The Applicant is the company that owns the Offshore Project (i.e., Havbredey Limited). Northland Power Inc. ('Northland') is the indirect owner of 75.5% of the share capital in the Applicant and ESB indirectly owns (24.5%) of the remaining capital of the Offshore Project.

Northland Power is a global power producer dedicated to helping the clean energy transition by producing electricity from clean renewable resources. Founded in 1987, Northland has a long history of developing, building, owning and operating clean and green power infrastructure assets and is a global leader in offshore wind. In addition, Northland owns and manages a diversified generation mix including onshore renewables, efficient natural gas energy, as well as supplying energy through a regulated utility.


Headquartered in Toronto, Canada, with global offices in eight countries, Northland owns or has an economic interest in approximately 3.4 gigawatts (GW) (net 2.9 GW) of operating capacity. The Company also has a significant inventory of projects in construction and in various stages of development, encompassing approximately 12 GW of potential capacity.

Northland embraces and supports the Scottish Offshore Wind Energy Council's (SOWEC) vision for an offshore wind sector that plays to Scotland's strengths, delivering jobs, investment, and export opportunities in line with the UK Offshore Wind Sector Deal as a key part of the path to net-zero.

ESB is a leading Irish state-owned energy company, with significant experience in the offshore wind industry, including within Scotland. ESB's investment in the Project demonstrates a strong interest in ScotWind and in developing offshore wind in Scotland, and brings together two very experienced companies with complementary skills, resources, and ambitions. Established in 1927, ESB is involved in six offshore wind projects and 2 GW of onshore wind projects in Scotland, as part of its drive for a 5 GW renewable electricity portfolio across Ireland, Northern Ireland and Great Britain by 2030.

Launched in 2022, its Driven to Make a Difference: Net Zero by 2040 strategy sets out a clear roadmap for ESB to achieve net zero emissions by 2040. It also commits ESB to a Science Based Target for 2030 to provide assurance that ESB is decarbonising its operations at the necessary pace and scale. As a strong, diversified utility, ESB operates across the electricity market, from generation through transmission and distribution to supply to customers, in addition to using networks to carry fibre for telecommunications.

Northland and ESB take a long-term view of their decision-making processes and will seek to reaffirm the strong relationships already established with communities and stakeholder representatives on the Western Isles and in the north of Scotland.

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1.3. NEED FOR THE PROJECT

In order to tackle climate change and reduce Greenhouse Gases (GHGs), offshore wind power will play an important role in future electricity generation. The Offshore Project will contribute towards the Scottish Government’s target to deliver an additional 20 GW of renewable electricity capacity by 2030, equating to approximately 50% of Scotland’s current total energy demand (Scottish Government, 2023). The Scottish Government also aims to have decarbonised Scotland’s entire energy system almost completely by 2050 (Scottish Government, 2024). Offshore wind power will be vitally important to meet these targets. With a potential capacity of around 1,500 megawatts (MW), the Offshore Project could meet the average annual electricity needs of more than 2.1 million Scottish homes and save more than 2.9 million tonnes of carbon dioxide (CO₂) emissions every year.

1.4. PROJECT OVERVIEW

The Applicant is seeking to develop a FLOW project with a 35-year consent period, utilising up to 110 floating WTGs, with a potential generating capacity of 1,500 MW. The Offshore Project is expected to have a point of connection to the grid in the vicinity of the Landfall Area of Search but, as noted in Section 1.1, is awaiting confirmation via the OTNR and HNDFUE. The Array Area is approximately 391 km² in size; water depths across the Array Area range from 75-116 metres (m), making the site well suited to floating foundations. Further details of the Project Design Envelope (PDE) and programme are provided in Chapter 2: Site Selection and Project Description.

1.5. OFFSHORE SCOPING REPORT


1.5.1. PURPOSE AND OBJECTIVE

The purpose of this Offshore Scoping Report is to identify key topics to be included and addressed within the Offshore EIAR, by providing regulators and stakeholders with information on the Offshore Project, baseline data sources and assessment methodologies to be used, promoting engagement with stakeholders throughout the pre-application stage.

This Offshore Scoping Report supports a request made to Scottish Ministers for a formal Scoping Opinion in relation to the Offshore Project. Once the Scoping Opinion is received, the Applicant will use the response to inform the scope, approach and methodology of the Offshore EIAR, which will be submitted alongside the consent application.

1.5.2. APPROACH

The approach to this Offshore Scoping Report is to identify likely significant effects associated with the construction (inclusive of pre-construction surveys), operation and maintenance, and decommissioning of the Offshore Project. As a first step, impacts are identified based on the type, scale and nature of activities

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proposed, and the biological, physical and human receptors present within the receiving environment. Once identified, impacts are proposed to be either:

- Scoped into the Offshore EIAR where the impact may cause a likely significant effect on a specified receptor; or
- Scoped out of the Offshore EIAR where the impact is unlikely to cause a likely significant effect on a specified receptor (including when designed in mitigation measures are adhered to). Justification for impact pathways that are proposed to be scoped out of the Offshore EIAR is provided within technical topics.

This proportionate approach to scoping an EIAR is in line with the Electricity Works (Environmental Impact Assessment (EIA)) (Scotland) Regulations 2017, the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and the Marine Works (Environmental Impact Assessment) Regulations 2007.

This Offshore Scoping Report will follow the PDE approach (also known as the Rochdale Envelope approach), in accordance with current best practice and the “Rochdale Envelope Principle”¹. Where the full details of a project are not known at application submission, the PDE approach allows for some flexibility in project design options as a range of parameter values can be presented for each project aspect; this applies particularly to WTG type and floating substructure design but has applications across the Offshore Project as a whole.


As long as conditions are built into the issued consents so that the maximum likely significant effects will not be exceeded by the final built development, this approach is fully endorsed by the Scottish Government as enabling the legal requirements of the relevant EIA Regulations to be complied with. In practice, the PDE approach has been followed in the majority of OWF applications in the United Kingdom (UK).

1.5.3. STRUCTURE

The structure of this Offshore Scoping Report is as follows:

- Introduction
- Site selection and project description
- Policy and legislation
- Proposed approach to EIA
- Consultation
- Technical topics

¹ Case law (i.e. R v Rochdale MBC ex parte Tew (1999) and R v Rochdale MBC ex parte Milne (2000)). In respect of Section 36 consent, whichever scheme is ultimately built must have been covered by the scope of the EIA.

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- Proposed Offshore EIAR structure

1.5.4. HOW TO RESPOND TO SCOPING

The Applicant is committed to informing and engaging with organisations and members of the public interested in the Offshore Project. There are a number of ways to keep informed of developments:

- The Offshore Scoping Report, other documents and updates will be published on the Project website. Available online at: www.havbredey.co.uk
- By email at: havbredey@northlandpower.com

A number of questions have been included within the Offshore Scoping Report and are included to focus the responses of consultees.

The Applicant will be organising consultation sessions, public exhibitions, and other engagement activities throughout the duration of the development process. Information regarding the time and location of such events will be made known to the public in advance and will be shared on the project website.

1.6. CONSENTING STRATEGY

The Offshore Project will require:


- a Section 36 consent under the Electricity Act 1989
- a Marine Licence(s) under the Marine and Coastal Access Act (MCAA) 2009 (applicable to Scottish offshore waters between 12 nautical miles (nm) and 200 nm)
- a Marine Licence(s) under the Marine (Scotland) Act 2010 (applicable to Scottish inshore waters between MHWS and 12 nm)

The Applicant will prepare and submit an Offshore EIAR to support the required applications for offshore consents, licences and permissions for the Offshore Project. Further ancillary consents, licences and permissions, such as but not limited to additional marine licence(s), European Protected Species (EPS) licence(s) and safety zone application(s) may be required during the lifetime of the Offshore Project.


Separate consents, licences and permissions will be sought by the Applicant for onshore infrastructure as required.

1.7. REFERENCES

Scottish Government (2023). Scotland's Energy Strategy and Just Transition Plan: Ministerial statement. Available at: <https://www.gov.scot/publications/scotlands-energy-strategy-transition-plan-ministerial-statement/>. [Accessed November 2024].

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2. SITE SELECTION AND PROJECT DESCRIPTION

2.1. INTRODUCTION

This chapter of the Offshore Scoping Report summarises how the location of the Array Area was selected by Crown Estate Scotland (CES) and awarded to the Applicant, describes the design components associated with the Offshore Project and outlines activities to be undertaken throughout the construction, operation and maintenance (O&M) and decommissioning phases. The project description draws upon the latest design information, combined with the current understanding of the baseline environment based on desktop studies.

The following design components associated with the Offshore Project are considered within this Offshore Scoping Report:


- WTGs
- WTG floating substructure, mooring and anchors system
- Inter-array cables (static and dynamic) and associated protection where necessary
- Offshore substation(s) and associated foundation(s)
- Structures containing Power 2 X (P2X) technology
- Offshore export cable(s) and associated protection where necessary (and RCS, if required)
- Landfall (up to MHWS)

Onshore project components, including transmission infrastructure above Mean Low Water Springs (MLWS), will be subject to a separate consent application. Onshore Project components are not covered within this Offshore Scoping Report, apart from project components located within the intertidal area (i.e. between MLWS and MHWS)².

2.2. PROJECT PROGRAMME

The construction programme for the Project will need to align to availability of the onshore grid infrastructure, which is separate to the Project. The onshore grid infrastructure is currently anticipated to be delivered in 2035. The Offshore Project is expected to take approximately 5 years for construction to allow for suitable weather windows for site preparation and installation of all offshore infrastructure. As the

² Both the Offshore Scoping Report and Onshore Scoping Report and subsequent Offshore EIAR and Onshore EIAR will assess Project activities located within the intertidal area.

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Offshore Project progresses key milestone dates and activity durations will be refined based on site investigation and finalisation of component designs.

2.3. PROJECT DESIGN ENVELOPE APPROACH


The PDE approach (also known as the Rochdale Envelope approach) will be adopted for the assessment of the Offshore Project. The PDE concept allows for some flexibility in project design options where full project details are not known at consent application submission. Guidance on using the PDE approach for applications requiring a degree of flexibility has been prepared by Marine Directorate (MD) and the Energy Consents Unit under Section 36 of the Electricity Act 1989³:

"It is also recognised that in some instances, the nature of the proposed development and evolving technology mean that some aspects of the final project are yet to be settled in precise detail at the time that the application is submitted (such as the precise location of certain types of infrastructure, the foundation type, the size of certain structures or the turbine model). Where that is the case and some details are still to be finalised, the design envelope approach can be employed for such applications to enable a degree of flexibility and address these uncertainties. Through the design envelope approach, the application can set out parameters for the proposal including the maximum extents of the proposal and can assess on that basis what the likely worst case effects of the proposal may be. The detailed design of the project can then vary within this 'envelope' to ensure that the project as-constructed has been properly assessed. The approach taken must be sufficient to enable a proper assessment of effects in the context of the receiving environment".

The PDE approach is based on establishing a series of minimum and/or maximum design parameters to assess the maximum potential effect of the Offshore Project. The PDE approach ensures effects can still be assessed in instances where the final project design is not available at the time of consent application. The maximum extent of significant effects can be adequately assessed when using the PDE approach whilst simultaneously allowing the project design to vary within a given 'design envelope'.

The PDE approach is a well-established and lawful approach to project design and assessment. It has been endorsed by the Scottish Government as enabling the legal requirements of the relevant EIA Regulations to be complied with, as long as conditions are built into the issued consents which ensure that the maximum

³ Scottish Government (2022) Guidance for applicants on using the design envelope for applications under Section 36 of the Electricity Act 1989, available online: <https://www.gov.scot/publications/guidance-applicants-using-design-envelope-applications-under-section-36-electricity-act-1989/pages/2/>

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parameters will not be exceeded by the final built development and have the potential to lead to a significant effect which has not been assessed.

An example of the PDE approach would be where several types of WTG floating substructure mooring and anchoring systems are being considered, each requiring a different number and size of anchors to the seabed. Assuming the number of WTGs remains consistent, the assessment of seabed habitat loss would be based on the system known to have the greatest impact magnitude (the maximum adverse impact) on the seabed which in this instance would be the system with the largest seabed footprint. If no likely significant effect is anticipated after undertaking the impact assessment, it can be assumed that any project parameters within the PDE will have the same or reduced environmental effects and will therefore also have no likely significant effects upon for the topic/receptor under consideration. The maximum adverse impact may vary by environmental topic.

2.4. THE OFFSHORE PROJECT


As illustrated in Figure 1-1, the Offshore Project is split into the Array Area and the Offshore Cable Corridor Area of Search. Infrastructure will be located in these 2 areas as follows:

- Array Area: where the FLOW will be located, which includes the WTGs, floating substructures and associated anchors and mooring lines, inter-array cables and associated cable protection, fixed OSP(s) and structures containing P2X technology (if selected)
- Offshore Cable Corridor Area of Search: where export cables to shore will be located, alongside associated cable protection. RCSs will also be located along the cable route if required. Landfall will occur within the area of the Offshore Cable Corridor Area of Search that interacts with the coastline (as shown in Figure 1-2 and defined as the 'Landfall Area of Search')

Table 2-1 presents the main parameters of the Offshore Project available for the Offshore Scoping Report. Section 2.6 provides further details on each of these parameters, including the minimum/maximum scenarios that comprise the Offshore Scoping PDE. During the EIA process, the Offshore Scoping PDE will be refined to provide an Offshore EIAR PDE on which to base the subsequent assessment.

Table 2-1 Main Offshore Project Design Parameters

Parameter	Value
Number of WTGs	Up to 110
WTG blade tip height above mean sea level (MSL)	Up to 385 m
WTG rotor diameter	Up to 330 m
Number of OSPs	Up to 3
Number of RCSs	Up to 3
Number of offshore export cables	Up to 6

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Parameter	Value
Length of each offshore export cable	Up to 135 km

2.5. SITE SELECTION AND CONSIDERATION OF ALTERNATIVES

2.5.1. SCOTWIND

CES administered the first ScotWind leasing process, undertaking the site selection process for offshore renewable developments in Scotland in November 2017. MD (formally known as Marine Scotland), as the Planning Authority for Scotland's seas, informed the spatial development for this leasing round; it undertook a planning exercise, in accordance with relevant European Community, UK, and Scottish legislation. In October 2020, the Sectoral Marine Plan (SMP) for Offshore Wind Energy was published (Scottish Government, 2020).

The SMP identified Plan Options (PO) for the future development of commercial scale offshore wind energy in Scotland. Within this, 20 POs were identified, which were subject to Strategic Environmental Assessment (SEA), plan level Habitats Regulation Appraisal (HRA), socio-economic assessment and stakeholder consultations before final adoption. The basis of the ScotWind leasing round was formed by SMP identified POs. The Option Agreement Area (OAA) is located within the N2 PO area, and this OAA forms the basis of the Array Area for the Offshore Project.

2.5.2. OPTION AGREEMENT AREA


As part of the bid preparation work undertaken by the Applicant, consideration was given to known constraints in combination with the target generation capacity to identify a suitable OAA within the N2 PO area (561 km²).

Key offshore constraints considered and used to identify the OAA included:

- Technical: bathymetry and slope, ground conditions, metocean conditions, windspeed, constructability and installation and maintenance
- Environmental: seascape, landscape and visual designations, and marine ecology and ornithology
- Human: shipping and navigation routes, marine archaeology, unexploded ordnance (UXO) and fishing activities (both leisure and commercial)

The constraints analysis concluded that the majority of parameters assessed did not represent a hard constraint at the time of the study, whilst recognising that further work would need to be undertaken as part of Offshore EIAR/engineering studies to confirm this. From this assessment, a preferred 391 km² area was identified within the total N2 PO area to form the basis of the ScotWind submission for the OAA.

Key contributing factors to the selection of the preferred area were:

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- Avoidance of medium density marine traffic areas along the southern boundary of the N2 PO to reduce shipping risk to project facilities and reduce hinderance to current shipping routes
- Avoidance of installation and O&M activities within 5 km of Special Areas of Conservation (SAC)

OAs were awarded to the successful parties in January 2022, following evaluation of the bids by CES; final confirmations as signed were offered in April 2022⁴. The Applicant was the successful bidder for the N2 PO and was awarded the 391 km² OA which is referred to as the Array Area within this Offshore Scoping Report.

2.5.3. OFFSHORE CABLE CORRIDOR AREA OF SEARCH IDENTIFICATION AND SELECTION

An Offshore Cable Corridor Area of Search has been developed, covering a broad area between the Array Area and potential landfall sites on the north coast of mainland Scotland (see Figure 1-1). The Offshore Cable Corridor Area of Search considers the location of the Array Area and the most eastern and western potential export cable landfall areas as identified through the Landfall Area of Search identification process (see Section 2.5.4). In addition, the Solan Bank Reef SAC is located approximately 5 km to the east of the Array Area. While it is not possible to exclude this SAC from the Offshore Cable Corridor Area of Search at this stage of the Offshore Project, the Offshore Cable Corridor Area of Search includes sufficient space to the south of the Array Area to avoid this SAC if possible following further studies and investigations that will be undertaken as the Offshore Project progresses.


The final offshore export cable corridor will be refined following:

- Selection of a preferred landfall location(s)
- Environmental, technical and commercial studies and surveys
- Consultation with interested parties

2.5.4. LANDFALL AREA OF SEARCH IDENTIFICATION AND SELECTION

The Landfall Area of Search was initially identified through a desktop review of potentially suitable landfall locations along the north coast of mainland Scotland between Bettyhill and Dunnet. This was followed by a site visit to ground truth the desktop exercise and further understand potential constraints at each location. A number of technical and environmental criteria were considered at both the desktop and site visit stages, including but not limited to: nearshore approach; beach composition and exposure; potential works/landfall/Transition Joint Bay (TJB) locations; coastal erosion; obstructions & existing infrastructure; access; amenity considerations; ecology; and archaeology & cultural heritage.

⁴ A further stage, the ScotWind Leasing “clearing process” opened in April 2022 with Option Agreements being offered in August 2022 and confirmed as signed in November 2022.

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Of the seven potential landfall sites visited, three were discounted due to technical constraints such as considerable access constraints and lack of suitable onshore works/TJB areas. The remaining four locations were considered potentially viable landfalls and further work is required to fully understand constraints, land ownership and potential onshore and offshore cable corridors. Given the limited potentially viable landfall options and the early stage of the Offshore Project, it is possible additional landfall locations may need to be identified as the Offshore Project progresses. The approach therefore taken to defining the Landfall Area of Search for the Offshore Scoping Report has been to reduce the number of landfall areas between Bettyhill and Dunnet as far as possible while maintaining flexibility at this early stage through:

- Inclusion of the four identified potential landfall areas
- Inclusion of coastal areas between Bettyhill and Dunnet with the exception of:
 - The three potential landfall locations visited during the site visits and deemed unviable
 - Coastal locations backed by large areas of peat, with no potential for onshore works areas/TJBs outside of an area of peat, as identified by satellite imagery
 - The coastline of the Dounreay Nuclear Power Station
 - The coastline of the Forss Business and Energy Park
 - Scrabster Port

The Landfall Area of Search, as shown in Figure 1-2, will be refined based on further technical and environmental constraints analysis from an onshore and offshore perspective.

2.6. OFFSHORE PROJECT INFRASTRUCTURE


2.6.1. LOCATION

As discussed in Section 2.5.2, the Array Area is located within the N2 PO with a total area of 391 km². Water depths range from 76-116 m relative to Lowest Astronomical Tide (LAT), with the shallowest waters towards the centre and the deepest waters at the western corner of the Array Area. The Array Area will include floating offshore WTGs, with associated mooring lines, anchors, inter-array cables and OSPs that will be designed for installation and operation of the Offshore Project.

The Offshore Cable Corridor Area of Search covers a broad area between the Array Area and the north coastline of mainland Scotland. The total area of the Offshore Cable Corridor Area of Search is 3,173 km². This area will be reduced in size and refined as the design of the Offshore Project progresses and cable corridors (and preferred landfalls) are identified.

2.6.2. LAYOUT

WTG layout within the Array Area will be determined once the design optimisation process has been completed. The design optimisation process will take into account a number of components, including but not limited to the WTG model choice, WTG spacing arrangements and wind direction, wake management,

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geotechnical characteristics (and associated foundation requirements), metocean conditions, benthic habitats, navigational safety considerations and other marine / seabed constraints.

Each individual WTG within the Array Area will be micro sited in order to consider any technical constraints and positioning accuracy. The indicative minimum spacing between WTGs included within the design parameters at this stage is 900 m (both across wind and down wind).

2.6.3. WIND TURBINE GENERATORS

The Offshore Project will comprise of up to 110 WTGs, each comprised of three rotor blades, a nacelle housing the generating unit, hub, and tower section. The iterative wind farm layout process will determine the final number of WTGs to be constructed, based on the capacity of individual WTGs used and site-specific survey results. Figure 2-1 illustrates an indicative offshore floating substructure and WTG design for the Offshore Project.

Following policies, best practice guidance and consultation with relevant consultees for aviation and shipping and navigation authorities, a scheme for WTG lighting and navigation marking will be agreed.

The Offshore Scoping PDE values for the WTGs are presented in Table 2-2.



Figure 2-1 WTG with Indicative TetraSub Type Floating Foundation Structure. Source: Stiesdal Offshore.


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Table 2-2 Offshore Scoping PDE Parameters for WTGs

Parameter	Value
Number of WTGs	Up to 110
WTG blade tip height above MSL	Up to 385 m
WTG rotor diameter	Up to 330 m
WTG Air Gap (between minimum blade tip height and MSL)	22 m or greater
WTG hub height above MSL	Up to 220 m
Spacing between individual WTGs	900 m or greater

2.6.4. FLOATING SUBSTRUCTURE

The floating substructure foundation must be suitable for the site characteristics such as water depth and wave heights, and for the loads transferred by the WTG. The substructures must also allow for safe and efficient installation and O&M activities. Water depths across the Array Area range from 75-116 m, and the spring tidal range is approximately 3.0 m increasing slightly (by 0.1 m) to the southern end of the Array Area.

A range of substructure types are proposed for use and will be considered within the Offshore Scoping Report, including semi-submersible (steel/concrete material), tension-leg platform (steel material) and barge (steel/concrete material). The exact substructure type to be used will not be confirmed until the design of the Offshore Project has been finalised. Up to 110 floating substructures are proposed, alongside the maximum proposed number of individual WTGs.

Figure 2-2 illustrates the range of floating substructure designs being considered. The Offshore Scoping PDE values for the floating substructures are presented in Table 2-3.

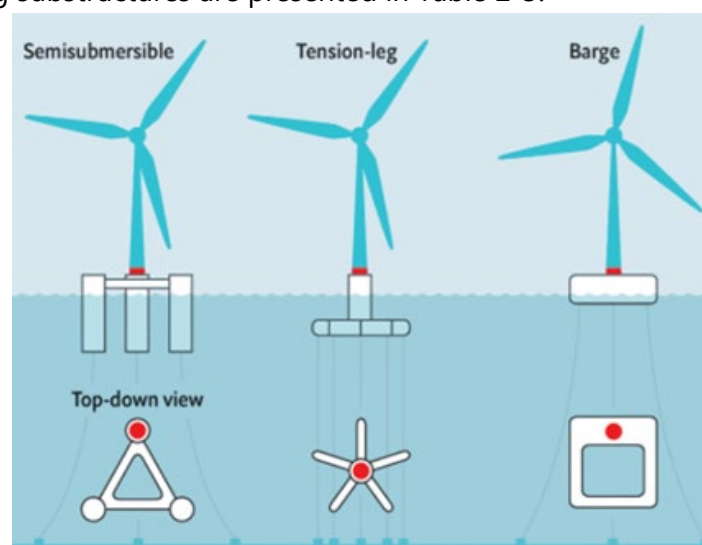


Figure 2-2 Floating Substructure Design


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Table 2-3 Offshore Scoping PDE Parameters for Floating Substructures

Parameter	Semi-Submersible	Tension-Leg Platform	Barge
Number of floating substructures	Up to 110	Up to 110	Up to 110
Height above MSL (min – max range)	20 – 25 m	20 – 25 m	10 – 15 m
Sea surface footprint (per floating substructure) (min – max range)	6,000 - 11,200 m ²	4,500 – 5,250 m ²	4,255 – 7,225 m ²
Total size (length x breadth x width (m)) (min – max range)	(120 x 100 x 140) - (160 x 140 x 185)	(95 x 95 x 83) – (105 x 105 x 91)	(65 x 65) ⁵ – (85 x 85) ⁵
Operational draught range (min – max range)	20 – 25 m	35 – 45 m	20 – 25 m

2.6.5. MOORING SYSTEM

The mooring system for the associated floating substructure contributes to the stability of the floating platforms and WTG. A range of mooring systems are proposed for use and will be considered within the Offshore Scoping Report, including catenary, semi-taut, taut and tension systems. Figure 2-3 illustrates the range of mooring system designs being considered.

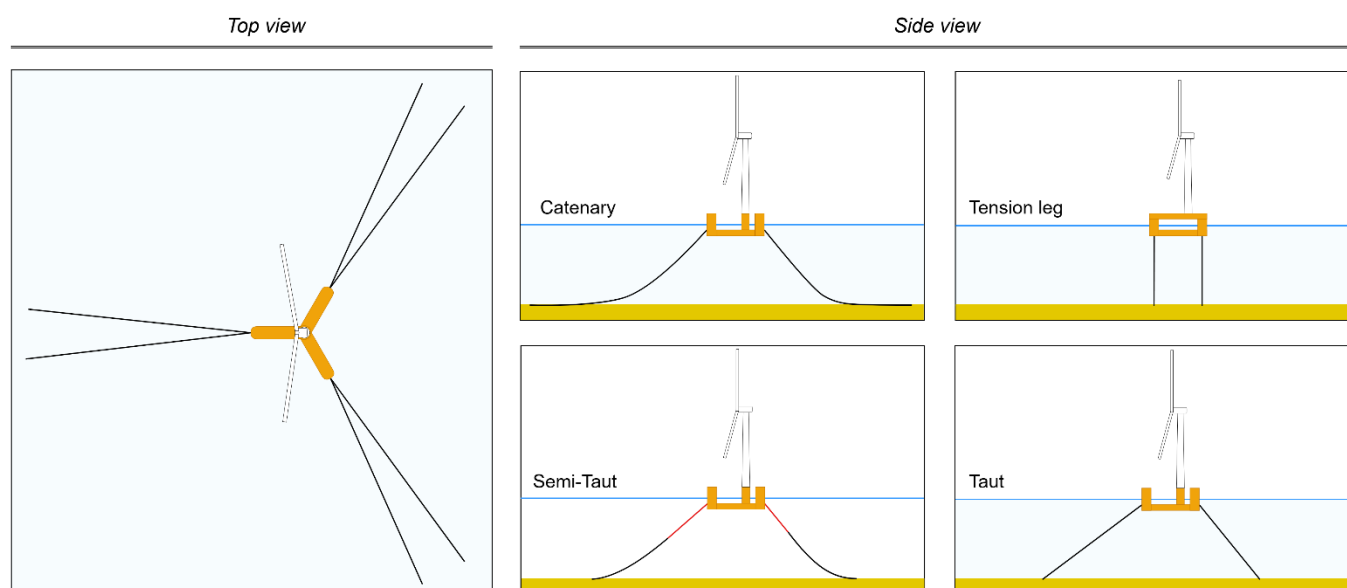



Figure 2-3 Mooring Options for the Offshore Project and an Exemplary Top View of the 3x2 Mooring Layout Applicable for Taut, Semi-Taut, and Catenary Mooring Systems. Source: ESB

⁵ These dimensions suggest barges have a square geometry, but they could be circular also with diameter the same as length/breath.

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The majority of the proposed mooring configurations utilises both chain and synthetic line materials, whilst the tension system utilises steel and synthetic line materials. The catenary, semi-taut, and taut systems could also have buoyancy elements and clump weights in their line makeup. The Offshore Project may seek to utilise a load reduction device in these mooring lines subject to further investigations. The exact mooring system to be used will not be confirmed until the design of the Offshore Project has been finalised. The Offshore Scoping PDE values for the range of mooring systems proposed are presented in Table 2-4.


Table 2-4 Offshore Scoping PDE Parameters for Mooring System

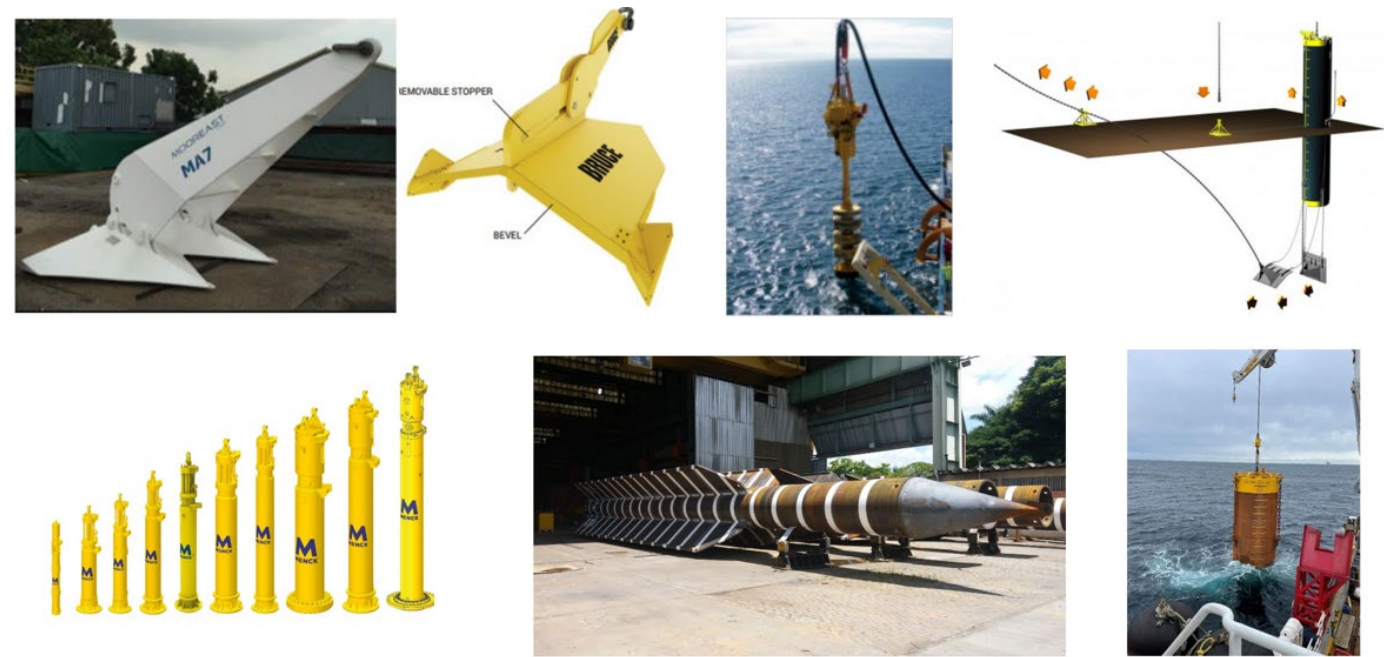
Parameter	Catenary	Semi-Taut	Taut	Tension
Number of mooring lines (per floating substructure) (min – max range)	3 - 9	3 - 9	3 - 9	3 - 9
Mooring line length (proportional to water depth)	Up to 12 times the water depth	2.5 – 3 times the water depth	2 – 3 times the water depth	Water depth with floater draft length subtracted
Number of mooring clump weights (per mooring line)	Up to 9	Up to 6	Up to 6	0

2.6.6. ANCHOR TYPES

A range of anchor types are being considered within the Offshore Scoping Report, including drag-embedment, vertically loaded, driven pile, drilled and grouted pile, suction caisson and gravity. Figure 2-4 illustrates the range of proposed anchor types.

The anchor system will need to be suited to the ground conditions within the OAA and be designed to accommodate the loads imparted by the final selected mooring configuration, the exact anchor type to be used will not be confirmed until the design of the Offshore Project has been finalised. The Offshore Scoping PDE values for the range of anchor types proposed are presented in Table 2-5.

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Top row – left to right: Drag Embedment Anchors x2, Drill used for Drilled and Grout Anchor System, Suction Embedded Plate Anchor
Bottom row – left to right: Hydraulic Impact Hammer used for Driven Pile Anchor, Dynamically installed/ Torpedo Anchor, Suction Pile Anchors
Figure 2-4 Anchor Design. Source: [Offshore Renewable Energy Catapult Reference: MA03 'Floating Offshore Wind Anchor Review' Public Summary Report.](#)



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Table 2-5 Offshore Scoping PDE Parameters for Anchor Types

Parameter	Drag-Embedment	Vertically Loaded	Driven Pile	Drilled and Grouted Pile	Suction Caisson	Gravity
Number of anchors (per floating substructure)	Up to 9	Up to 9	Up to 9	Up to 9	Up to 9	Up to 9
Anchor dimensions (per anchor)	Up to 20 x 10 x 10 m	Up to 20 x 10 x 10 m	Up to 6 m diameter	Up to 5 m diameter	Up to 10 m diameter	Up to 30 x 30 x 10 m
Anchor height above seabed	Buried	Buried	Up to 2 m	Up to 2 m	Up to 2 m	Up to 10 m
Anchor penetration depth	Up to 20 m	Up to 20 m	Up to 40 m	Up to 70 m	Up to 20 m	Up to 2 m
Seabed footprint of anchor only (per anchor)	Up to 200 m ²	Up to 200 m ²	Up to 30 m ²	Up to 20 m ²	Up to 80 m ²	Up to 900 m ²
Scour protection methods	Not required	Not required	Rock placement/ scour mat(s) and bag	Rock placement/ scour mat(s) and bag	Rock placement/ scour mat(s) and bag	Rock placement/ scour mat(s) and bag

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2.6.7. INTER-ARRAY CABLES

Inter-array cables are used to connect the individual WTGs to each other and onwards to a central collection point (e.g. an OSP). To ensure that physical and technical constraints, changes in available technology and project variability can be accommodated in the final design of the Offshore Project, flexibility is required in the number, location, depth of burial and protection methods of the inter-array cables.

The number of inter-array cables utilised within the Array Area will vary depending on the wind farm size, WTG capacities and electrical design options taken forward. A small number of WTGs may be grouped together on the same cable ‘string’, connecting those WTGs to an OSP. Subsea junction boxes or hubs may also be used, which would facilitate a ‘star’ type inter-array cable configuration, back to a central hub before connecting to the OSP. The inter-array cable configuration will be subject to progressing array design and suitable technology availability.

For the Offshore Project, up to 110 inter-array cables (‘strings’) plus additional cables for Back Links⁶ (if required) could be used. The exact route of the inter-array cables has not yet been defined, as these will be determined during the finalisation of the wind farm layout design process. Site-specific survey information will inform the location of the inter-array cable corridors, which will also support the decision on requirements for any additional cable protection to be implemented. The Offshore Project design currently proposes the use of both static and Dynamic Cables for use within the Array Area.


2.6.7.1. Static Cables

Inter-array cables utilise Static Cables along the seabed, where the cable is either buried or sits on the seabed. A range of installation methodologies can be including jetting, cutting, and controlled flow excavator techniques. The type of installation methodologies to be used will depend on both the cable type, and the results of site-specific surveys and studies. However, it can be assumed that a variety of techniques will be used for installation across the Array Area. Preparatory works may also be required, prior to any cable installation works. Cable stabilisation protection methods for Static Cables may utilise rock placement, mattresses, grout bags and/or rock bags.

2.6.7.2. Dynamic Cables

Inter-array cables for floating wind application will require the use of Dynamic Cables between the seabed and the floating substructures and will follow a lazy wave configuration for the Offshore Project. The lazy wave configuration accommodates for the dynamic movement of the floating substructures. Additionally,

⁶ Back Links connect WTGs at the end of two strings, allowing for partial re-routing of power in case of cable failure.

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Dynamic Cables accommodate for the loads the cables are exposed to by the whole water column, as well as withstanding abrasion from the seabed. Dynamic Cable sections can be connected to Static Cable sections using cable joints.

Figure 2-5 illustrates an indicative inter-array cable system design for the Offshore Project. The Offshore Scoping PDE values for the inter-array cable system are presented in Table 2-6.

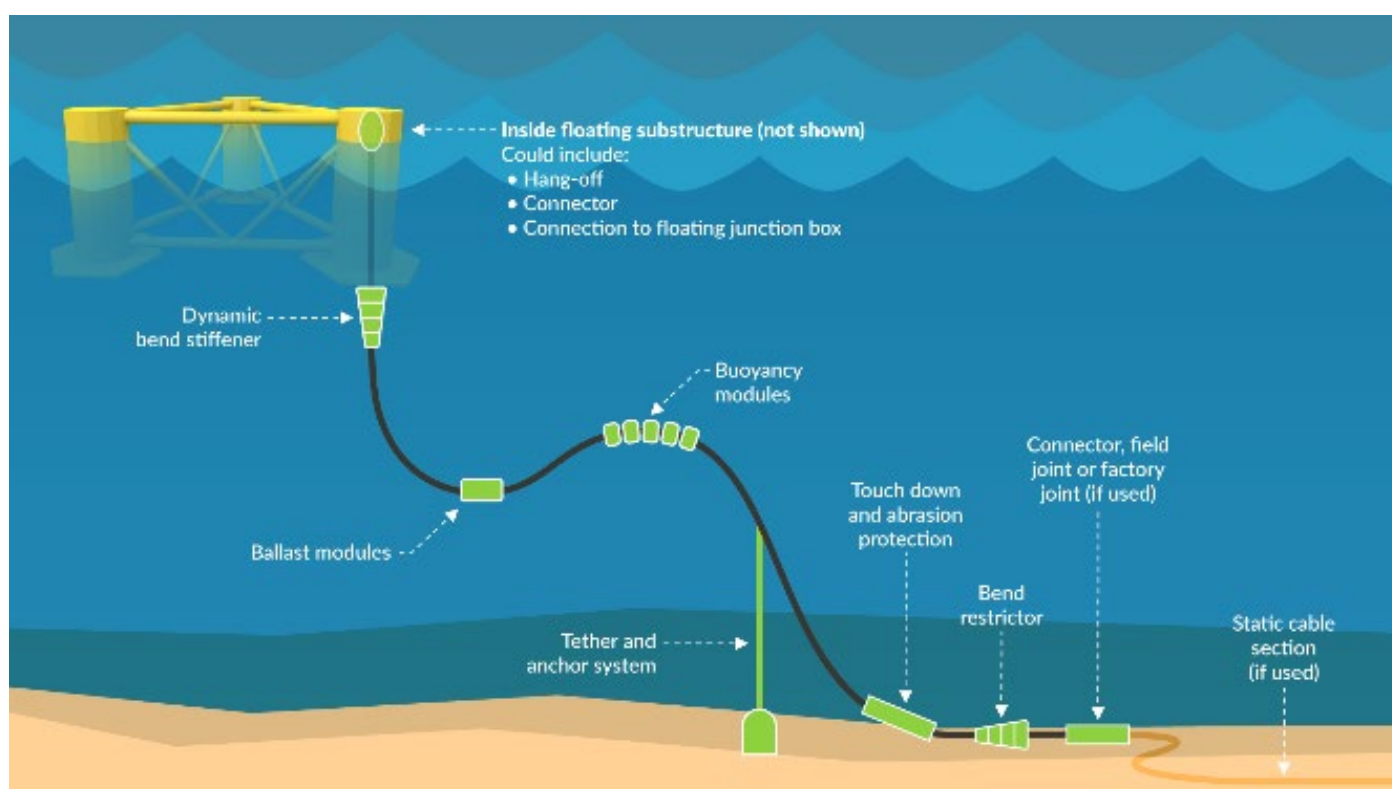



Figure 2-5 Inter-array Cable Design. Source: BVG Associates (<https://guidetofloatingoffshorewind.com/guide/b-balance-of-plant/b-1-cables/b-1-1-array-cable/>)

Table 2-6 Offshore Scoping PDE Parameters for Inter-Array Cables

Parameter	Value
Dynamic Cables	
Number of cables	Up to 110 plus additional cable Back Links if required
Total length of cables	Up to 22 km
Diameter of cable	Up to 300 millimetres (mm)
Number of buoyancy modules	Up to 10 (per Dynamic Cable)
Number of cable tethers (per Dynamic Cable end)	1
Static Cables	
Number of cables	Up to 110 plus additional cable Back Links if required

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Parameter	Value
Voltage	66 or 132 Kilovolts (kV)
Total length per cable	Up to 3.9 km plus additional length for Back Links, if required
Width of direct seabed footprint from cable installation (per cable)	Up to 15 m
Size of cable corridor (length x width)	Up to 3,900 m x 100 m per cable
Total length of cable trenches	Up to 430 km
Target burial depth	Up to 2 m
Trench depth	1 m or greater
Width of cable trench	Up to 2 m
Size of cable stabilisation protection (height x width)	Up to 3 m x 5 m
Number of cable crossings of 3 rd party infrastructure	Up to 5

2.6.8. OFFSHORE SUBSTATION PLATFORMS(S)

OSPs provide a centralised connection point for the inter-array cable circuits, providing connection to the offshore export cables. The OSPs convert in the case of High Voltage Direct Current (HVDC) or step up the electricity in case of High Voltage Alternating Current (HVAC) from the inter-array cable voltage. The transmission system electrical design is not yet developed and could be either HVDC or HVAC. The OSPs comprise 2 main components: (1) a substructure foundation; and (2) a topside. The substructure foundation will likely be a large jacket structure, which will be fixed to the seabed typically through piles, suction caisson, gravity base, or monopile, depending on the size of the OSP, ground conditions and water depth. Scour protection may be required for these structures. The topside of the OSPs will house electrical equipment, which converts or steps up the voltage from the inter-array cables, as well as housing supporting functions, such as storage, communications (including masts), and accommodation facilities. The offshore export cables will exit the OSPs and route towards landfall(s). The Applicant will also continue to monitor innovations in this area of subsea junction boxes and underwater substations. If suitable innovations become available that may reduce the requirement for large jacket and OSP topside structures these will be considered also.

RCSs may also be utilised along the offshore export cable, if required. RCSs provide a system to compensate for the reactive power generated through wind farm systems. RCSs are typically implemented at sites further offshore in order to transmit the electricity along longer cable routes whilst utilising HVAC transmission technology.


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Figure 2-6 illustrates a typical OSP design. A maximum of 3 OSPs are proposed to be developed within the Array Area, alongside a maximum of 3 RCSs (if required) along the export cable route. The Offshore Scoping PDE values for the OSPs and RCSs are presented in Table 2-7.

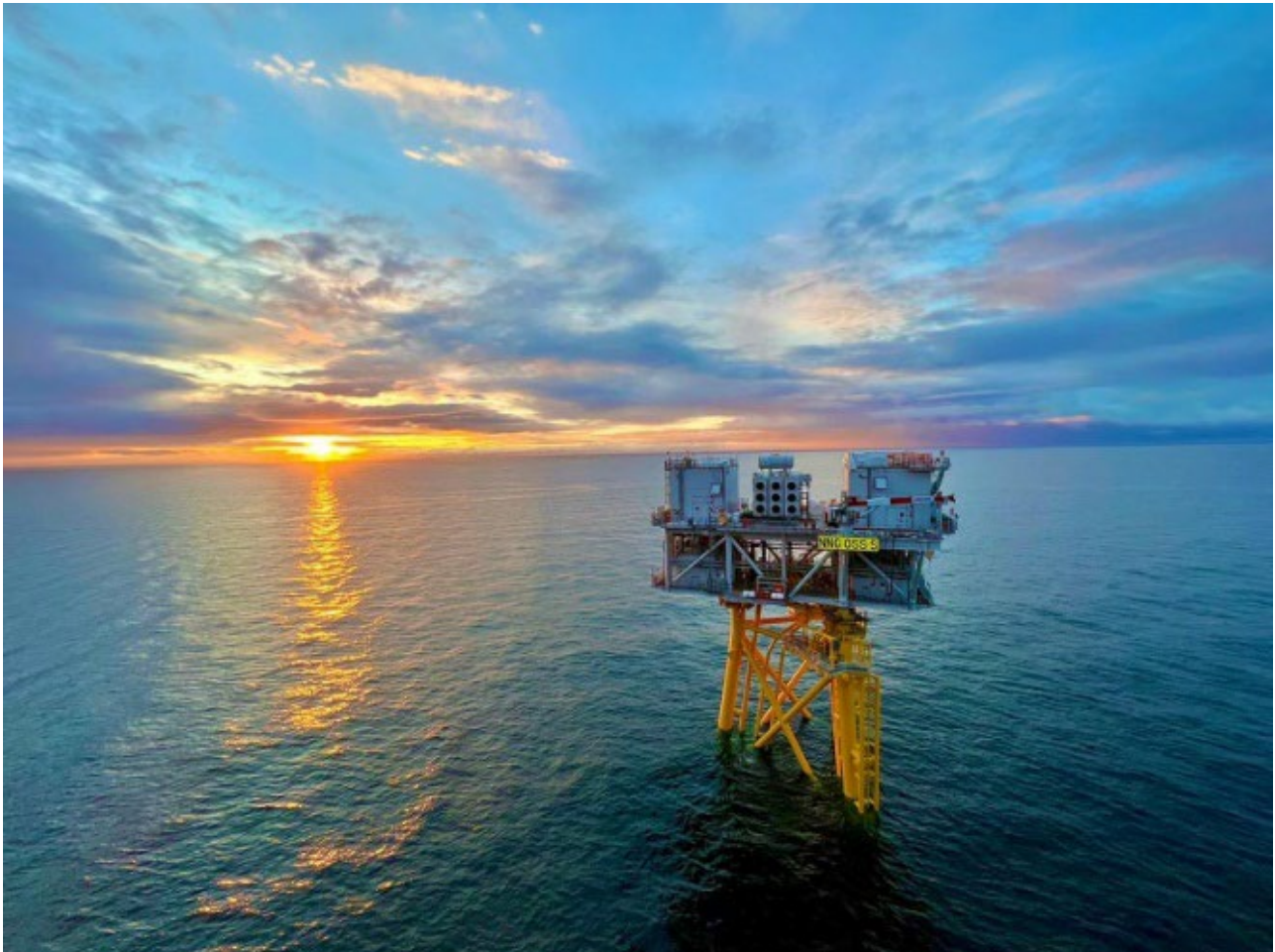



Figure 2-6 Typical OSP Design. Source: Image courtesy of ESB.

Table 2-7 Offshore Scoping PDE Parameters for Offshore Substations

Parameter	Value
Number of platforms	Up to 3 OSPs within the Array Area Up to 3 RCSs along the offshore export cable route
Height above LAT	Up to 70 m
Topside dimensions (length x width)	Up to 144 m x 85 m
Seabed footprint	Up to 110 m ²
Foundation type	Fixed (Jacket or Monopile)

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2.6.9. INTERCONNECTOR CABLES

OSPs may be connected to each other by interconnector cables within the Array Area in order to provide redundancy in the case of cable failure. If required, interconnector cables will be buried where needed and installed using the same methodologies proposed for static inter-array cables noted in Section 2.6.7.1. The Offshore Scoping PDE values for the interconnector cables are presented in Table 2-8.

Table 2-8 Offshore Scoping PDE Parameters for Interconnector Cables

Parameter	Value
Number of interconnector cables	Up to 2
Total length of interconnector cables	Up to 40 km
Width of direct seabed footprint from cable installation (per cable)	Up to 15 m
Target burial depth	Up to 2 m
Trench depth	Up to 2 m
Width of cable trench	Up to 2 m
Size of cable stabilisation protection (height x width)	Up to 3 m x 5 m


2.6.10. P2X TECHNOLOGY

The use of technology to convert electricity ('power' or 'P') generated from WTGs into other ('2') forms of energy or products ('X') may be included as part of the Offshore Project. The inclusion of structures containing P2X technology is intended to allow for future innovations, such as offshore storage, with anticipated infrastructure comprising an additional jacket and platform. While specifics are currently unavailable, it is assumed the footprint will be similar to an OSP, and any required assessment and consenting will follow relevant guidance and legislation in place at that time.

2.6.11. OFFSHORE EXPORT CABLES

Offshore export cables will transfer power from the OSFs to landfall. The exact offshore export cable route(s) have not yet been defined but will be within the Offshore Cable Corridor Area of Search. Site-specific surveys will inform the finalised locations of the offshore export cable corridors; the surveys will also inform the requirements for additional cable protection. To ensure physical and technical constraints, changes in available technology and project viability can be accommodated within the final design, flexibility is required in the location, burial depth and protection measures required for the offshore export cables.

With respect to installation, the offshore export cables will be buried where needed. Where shallow/no burial occurs, external cable protection may be deployed. This could take the form of (but not limited to), rock placement, mattressing, grout bags and/or rock bags. If cable protection is required, the protection

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measure will be dependent on several factors such as seabed conditions, seabed sedimentology and the local physical processes. A range of methodologies exist for offshore export cable installation and the preferred technology will be dependent on ground conditions. Installation methods being considered include cable plough, jet trencher, mechanical cutting trencher and or controlled flow excavator.


Up to 6 offshore export cables are proposed to make landfall within the Landfall Area of Search. HVDC or HVAC technologies are both being considered for the Offshore Project. The nominal voltage along the offshore export cables will be 220-275 kV for HVAC or ± 525 kV for HVDC. The maximum individual cable diameters for all offshore export cables are proposed to be up to 330 mm. The Offshore Scoping PDE values for the offshore export cables are presented in Table 2-9.

Table 2-9 Offshore Scoping PDE Parameters for Export Cables

Parameter	Value
Number of offshore export cables	Up to 6
Cable corridor size (length x width)	Up to 135 km x 2.5 km
Width of direct seabed disturbance during installation (per cable)	Up to 20 m
Target cable burial depth (min – max range)	1-5 m
Total length of cable trenches	Up to 810 km
Trench depth	1 m or greater
Width of cable trench	Up to 2 m
Size of cable stabilisation protection (height x width)	Up to 3 m x 20 m
Number of subsea joints	Up to 20
Dimension of a subsea joint (diameter x length)	Up to 3 m x 10 m
Height of subsea joint above seabed	Assumed to be buried. If insufficient overburden: Up to 3 m (diameter) x 10 m (length)
Number of crossings of 3 rd party infrastructure (cable route crossings)	Up to 7
Crossing dimensions (height x length x width) (estimated - depending on final crossing agreements)	Up to 4 m x 400 m x 25 m

2.6.12. LANDFALL

Exact landfall location(s) have not yet been defined but will be within the defined Landfall Area of Search. Site-specific surveys will inform the finalised landfall location. The Offshore Project is currently proposed to make landfall between Bettyhill and Dunnet Bay, on the north coast of mainland Scotland. Up to 6 offshore export cables will be met by up to 6 TJBs within the vicinity of the landfall location(s) to house the interface

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between the offshore export cables and onshore export cables. The TJBs are planned to be located above MHWS and are therefore not considered within the Offshore Scoping PDE. Landfall installation works will utilise open cut or trenchless methods.

The Offshore Scoping PDE values for landfall are presented in Table 2-10.

Table 2-10 Offshore Scoping PDE Parameters for Landfall

Parameter	Value
Number of export cables making landfall	Up to 6
Landfall installation method	Open cut or trenchless (e.g. horizontal directional drilling (HDD))


2.7. PROJECT PHASES

2.7.1. CONSTRUCTION

Indicative sequencing for the construction of the Offshore Project is provided in Table 2-11. The exact sequencing and timing of the construction works will be developed further and presented in the Offshore EIAR.

Table 2-11 Indicative Sequence of Offshore Construction Activities

Activity	Description
Pre-construction surveys and site investigations	These may include geophysical, geotechnical and benthic surveys, UXO clearance surveys and metocean measurement campaigns.
Site preparation, foundation and substructure installation	Prior to the installation of the Offshore Project, seabed preparations may be required for the OSP foundations and offshore cable infrastructure. This may include boulder clearance and pre-lay grapnel runs.
OSP installation	OSP foundation structures (& RCSs if required) are typically pre-installed ahead of the topside structure. Depending on the selected design of the OSP, the installation technique for the foundation structures will vary.
Offshore export cables – landfall and offshore installation (and interconnector cable(s) if required)	Following the completion of the necessary landfall and associated onshore works, and the offshore site preparations, the offshore export cables will be installed from the selected landfall site, out to the Array Area, or, pulled from offshore vessels towards the landfall. Pre-trenching works may be required prior to the cable installation. A variety of installation techniques may be utilised to ensure the offshore export cables are buried where needed. External cable protection will be installed following the cable lay and burial, where necessary.

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Activity	Description
	Interconnector cable(s) will be used to connect the OSPs to each other within the Array Area, if required.
Anchor and mooring installation	Mooring systems and anchors will likely be installed prior to the tow out and hook-up of the floating offshore WTGs.
Floating WTG installation	The floating WTG (and associated platform structure) will be towed in a fully mated condition from a port or Wet Storage area to the Array Area and then connected to the pre-installed anchor and mooring systems (see Section 2.7.1.1).
Inter-array installation	The inter-array cables will be installed between the WTGs, typically as strings, connecting multiple WTGs to a single circuit. The most likely scenario is that the inter-array cables will be installed following hook-up of the floating offshore WTG to the moorings.
WTG installation/commissioning	The WTGs will be assembled onshore and transported/towed to the Array Area for hook-up. Following installation of the WTG and connection to the inter-array cabling system, a process of commissioning and testing (including Grid Code Compliance tests) will be undertaken.

Depending on the technologies adopted and potential changes due to improvements in both the technology and supply chain, the specific details on installation will vary. It is anticipated that a range of vessels will be used in the construction phase, including semisubmersible crane vessels, transportation barges, semisubmersible barges, anchor handling vessels, heavy transport vessels, heavy lift vessels, cable laying vessels, jackups, service operation vessels (SOVs), diving support vessels, construction support vessels, remote operated vehicle support vessels (ROSVs), rock placement vessels and guard vessels.

2.7.1.1. Wet Storage

In the context of an OWF, Wet Storage refers to the practice of temporarily storing offshore infrastructure within the marine environment until being ready for installation. Wet Storage may be needed to facilitate the construction of the Offshore Project either by the Applicant, ports and/or equipment providers. Wet Storage may be required for floating structures, mooring systems, anchors and/or inter-array cables.

At this early development stage, the requirements for and location of Wet Storage are currently not known for the Offshore Project and are unlikely to be determined until the post-consent stage. It is expected that relevant ports, harbours or other storage facilities will secure the necessary consents required to permit Wet Storage of offshore infrastructure associated with the Offshore Project.

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2.7.2. OPERATION AND MAINTENANCE (O&M)

The overall O&M strategy will be finalised once the project design is finalised. Scottish port capabilities are being assessed in order to understand the viability of options available for the O&M base to meet the Offshore Project requirements. The following classifications of maintenance may be required during the O&M phase:

- Routine maintenance activities: activities that are carried out on a regular basis based on the original equipment manufacturer recommendations and good industry practice, for example inspections, cleaning, painting, troubleshooting
- Unscheduled maintenance: activities that may be required to carry out repairs or remedial works to return the asset to serviceable condition
- Major component replacement/repair: Faults that could trigger emergency repairs requiring large component replacements and/or extensive remedial works


All offshore infrastructure, including WTGs, floating substructures and associated mooring and anchor systems, cables and OSPs, will be included in monitoring and maintenance programmes. The potential impacts of maintenance activities (including planned, unplanned, and major component) will be assessed within the Offshore EIAR, based on both experience and best practice.

Throughout the lifecycle of the Offshore Project, O&M activities may be required at any time. Routine maintenance activities are anticipated to be serviced through SOVs, crew transfer vessels, daughter craft, ROVSs and/or helicopters. Methods to perform major component exchanges will depend on WTG design and component replacement strategy. It may be possible to exchange major components in-situ in the Array Area by the use of either jackup barges, semisubmersible crane vessels, platform or WTG mounted mobile cranes. Alternatively, it may be required to tow the WTG and foundation assembly back to port, which will involve disconnecting from the moored position and inter-array cables and being towed by tugboats to a suitable port location.

2.7.3. DECOMMISSIONING

The Energy Act (2004) contains statutory requirements in relation to the decommissioning of offshore renewable energy installations and require the Offshore Project to provide a Decommissioning Programme supported by appropriate financial security prior to construction.

The guidance outlined in the Guidance Notes on Decommissioning of Offshore Renewable Energy Installations in Scottish waters or in the Scottish part of the Renewable Energy Zone under the Energy Act 2004, will be followed by the Decommissioning Programme. Associated decommissioning activities will comply with all relevant legislation at that time.

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In line with the relevant legislation and guidance at that time, the Decommissioning Programme will be reviewed and updated. Consultee bodies listed in the S105 Notices, and any additional consultees identified by Marine Directorate - Licensing Operations Team (MD-LOT) or the Applicant, will be provided with the opportunity to comment on the final decommissioning strategy.

When developing a Decommissioning Programme, best practice will be followed. It is anticipated that WTGs and OSPs will be removed in reverse order of their installation, with surface infrastructure likely to be fully removed. The decommissioning options for the cables and subsurface foundation infrastructure will be discussed with stakeholders and regulators, however, sections may be left *in situ* to avoid unnecessarily disturbing the seabed.

The Offshore EIAR will provide an overview of the anticipated decommissioning events and an assessment of the likely significant effects of this phase on receptors.


2.8. REFERENCES

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3. POLICY AND LEGISLATION

This chapter of the Offshore Scoping Report presents the key policy and legislation relevant to the Offshore Project. This includes UK and Scottish policies and legislation, and consents and licencing requirements.


3.1. CLIMATE CHANGE AND ENERGY POLICY AND LEGISLATION

3.1.1. GLOBAL CLIMATE AGREEMENTS

The United Nations Framework Convention on Climate Change (UNFCCC) is implemented through the Kyoto Protocol, which commits industrialised nations and economies in transition to meeting agreed-upon targets by limiting and reducing GHG emissions. The Climate Change Act 2008 transposed the commitments associated with the Kyoto Protocol into UK law, which requires a net 80% carbon account reduction for the year 2050 compared to the 1990 baseline.

The Paris Agreement was later adopted by 196 parties at the UN Climate Change Conference of the Parties 21 (COP21) in December 2015, entering into force in November 2016, as a legally binding international treaty on climate change. The Paris Agreement builds upon the framework established by the Kyoto Protocol, aiming for more ambitious global climate goals by involving all countries in reducing emissions and addressing climate resilience. It was negotiated under the UNFCCC and represents a progression from Kyoto by focusing on voluntary, nationally determined contributions (NDCs). The overarching goal of the Paris Agreement is to hold “the increase in global average temperature to well below 2°C above pre-industrial levels” and pursue efforts “to limit the temperature increase to 1.5°C above pre-industrial levels” (United Nations Climate Change, 2024).

In 2023, COP28 was held in the United Arab Emirates. As part of the established Global Renewables and Energy Efficiency Pledge, COP28 participants recognised that in order to meet the Paris Agreement goal, renewables deployment must be accompanied in this decade by a rapid increase of energy efficiency improvements and the phase down of unabated coal power (COP28, 2023). Additionally, it was recognised that particularly in the post-2030 period, an increasingly diversified portfolio of technologies will be market-ready and available at scale to decarbonize the energy sector, with a critical role for renewables, energy efficiency, and other zero-emissions technology (COP28, 2023). Participants actively recognised that this decade will be crucial for renewables and energy efficiency, with accelerated action and ambitious policy implementation that are vital to addressing energy security and affordability challenges (COP28, 2023).

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3.1.2. UK CLIMATE CHANGE AND ENERGY POLICY AND LEGISLATION

3.1.2.1. The Climate Change Act 2008

The Climate Change Act 2008, as amended by the Climate Change Act 2008 (2050 Target Amendment) Order 2019, established the UK's framework for reducing GHG emissions and addressing the climate emergency. It made the UK the first Group of Seven (G7) nation to set legally binding climate change targets in line with the Kyoto Protocol. Initially, the Act committed the UK to reducing GHG emissions by 80% against 1990 levels by 2050. In 2019, this target was strengthened to at least 100%, achieving net-zero emissions by 2050 (HM Government, 2008 & HM Government, 2019).

To support these targets, the Climate Change Act 2008 established the independent Climate Change Committee (CCC), which advises the UK government and monitors progress through carbon budgets. These budgets, which limit total GHG emissions over four-year periods, provide a stepwise approach to achieving long-term goals.

3.1.2.2. The Energy Act 2013

The Energy Act 2013 was adopted in order to establish a legislative framework for delivering secure, affordable and low carbon energy to the UK. The Energy Act 2013 includes provisions on decarbonisation, electricity market reform, and nuclear regulation (HM Government, 2022a).


3.1.2.3. The Energy Act 2023

The Energy Act 2023 establishes provisions for energy production and market regulation, addressing offshore energy production, environmental protection, licensing, and decommissioning. It underscores the UK's commitment to clean energy and energy security, particularly through offshore wind development. The Energy Act 2023 supports the Offshore Wind Environmental Improvement Package, introducing measures to halve consenting times for offshore wind projects while ensuring environmental protection. There is provision for strategic environmental compensation for offshore wind projects to be coordinated through the Strategic Compensation Framework and Marine Recovery Funds (HM Government, 2023).

Aligned with the goals of the Climate Change Act 2008, the Energy Act 2023 fosters low-carbon electricity generation and sets a framework for achieving decarbonisation targets for electricity by 2030. The Energy Act 2023 also facilitates energy market reform, which includes contracts for difference (CfD) to stabilise prices and encourage investment in low-carbon energy. Additionally, it promotes the development of hydrogen, carbon capture and storage (CCS), and heat infrastructure, further supporting the UK's transition to a low-carbon energy system (HM Government, 2023).

3.1.2.4. The Offshore Wind Sector Deal and Energy Security Strategy

The Offshore Wind Sector Deal was launched in March 2019, and was introduced in order to maximise the advantages for UK industry from the global shift to clean energy (HM Government, 2020). The British Energy

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Security Strategy was subsequently published in April 2022, with the aim to accelerate the UK towards a low-carbon energy future (HM Government, 2022). The strategy was published in response to a number of global and local concerns to provide clarity regarding the security, affordability, and sustainability of the UK's energy supply (HM Government, 2022).

3.1.2.5. Powering Up Britain: Energy Security Plan and Net Zero Growth Plan

The Powering Up Britain policy papers, published by the Department for Energy Security and Net Zero (DESNZ) in 2023 (DESNZ, 2023), outline the UK Government's strategy to enhance energy security, promote economic growth through the transition to low-carbon energy, and achieve net zero by 2050. The papers include both an Energy Security Plan and a Net Zero Growth Plan, emphasising the role of renewable energy sources, particularly offshore wind, as central to addressing the climate emergency. Key commitments include developing 5 GW of floating offshore wind capacity by 2030, supported by the Floating Offshore Wind Manufacturing Investment Scheme, which allocates up to £160 million to bolster port infrastructure projects.

3.1.3. SCOTTISH CLIMATE CHANGE AND ENERGY POLICY AND LEGISLATION

3.1.3.1. The Climate Change (Scotland) Act 2009


The Climate Change Act 2008 transposes the UK's commitments under the Kyoto Protocol into law, and these commitments are extended to Scottish law through the Climate Change (Scotland) Act 2009. This Act sets a legally binding target to reduce GHG emissions to 100% lower than 1990 levels by 2045. It is aligned with international climate goals, including the Paris Agreement's objective to limit global warming to well below 2°C, with efforts to limit it to 1.5°C. The Climate Change Act 2008 places responsibility on Scottish Ministers and public entities to ensure sustainable development and the promotion of low-emission options. In April 2024, the Scottish Government announced plans for new legislation introducing carbon budgets, which will replace the current emissions reduction targets.

3.1.3.2. The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019

The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 aims to reduce GHG emissions through the commitment to associated targets. The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 is designed to ensure that Scotland contributes effectively to meeting the global efforts outlined in the Paris Agreement, as well as the specific targets adopted at COP21. Interim targets for GHG reductions from COP21, including at least 75% by 2030 and 90% by 2040, will assist in achieving the overarching goal of reducing all GHG emissions to reach net-zero by 2045 at the latest.

3.1.3.3. The Scottish Energy Strategy: The Future of Energy in Scotland

The Scottish Energy Strategy: "The Future of Energy in Scotland", sets out the Scottish Government's 2050 vision for energy in the country. Published in 2017 (Scottish Government, 2017), the strategy outlines six key priorities, one of which is dedicated to advancing renewable and low-carbon solutions. This priority aims to

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harness Scotland’s extensive renewable energy resources while ensuring the country meets its decarbonisation targets. Although the priority specifically addresses emissions reduction targets, it is important to note that decarbonisation encompasses both the transition to renewable energy and the broader effort to reduce emissions across all sectors. In January 2023, the Scottish Government published a Draft Energy Strategy and Just Transition Plan for public consultation, aiming to update and expand upon the 2017 strategy. The final version of the Energy Strategy and Just Transition Plan is expected to be published imminently, further refining Scotland’s approach to achieving its long-term energy and climate objectives.


3.1.3.4. National Planning Framework 4

In order to adapt to the future impacts of climate change and to align with the delivery of the United Nations (UN) Sustainable Development Goals (SDG) up to 2045, Scottish Ministers approved a new national spatial strategy for reducing GHG emissions, namely The National Planning Framework (NPF) 4. The updated framework replaced the previous NPF3 on 13 February 2023. The development of Strategic Renewable Electricity Generation and Transmission Infrastructure (inclusive of both onshore and offshore renewable electricity generation including 50 MW+ generating stations) are classed as priority National Developments.

National Planning Policy 11 in NPF4 is concentrated on encouraging, promoting and facilitating the expansion of sustainable renewable energy developments.

3.1.3.5. Offshore Wind Policy Statement

The Offshore Wind Policy Statement (OWPS) outlines the Scottish Government’s ambitions for the future of offshore wind and sets the context for Marine Scotland’s SMP for Offshore Wind (Scottish Government, 2020b). The OWPS outlines the Scottish Government’s vision for offshore wind development and its crucial role in achieving the emissions reduction goals set by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, including the target of net-zero emissions by 2045. The OWPS builds upon the renewable energy ambitions detailed in Scotland’s Energy Strategy (Scottish Government, 2017), emphasising offshore wind’s potential to contribute to the country’s decarbonisation efforts with an ambition to increase offshore wind capacity to 11 GW of energy installed by the year 2030. The OWPS directly links to Scotland’s SMP for Offshore Wind (Scottish Government, 2020a) by providing strategic direction on the areas suitable for offshore wind development.

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3.2. MARINE PLANNING POLICY

3.2.1. UK MARINE POLICY

3.2.1.1. The UK Marine Policy Statement

The UK Marine Policy Statement (MPS) was introduced in March 2011 and was jointly adopted by the UK Secretary of State, Scottish Ministers, Welsh Ministers, and the Department of the Environment in Northern Ireland. It was prepared under the Marine and Coastal Access Act (MCAA) 2009, fulfilling the requirements of Section 44 of the Act. The MPS provides a framework for the preparation of Marine Plans across the UK and guides decision-making on matters affecting the marine environment, particularly in areas where marine plans have not yet been adopted. The MPS ensures that marine resources are used sustainably and in line with high-level marine objectives (Department for Environment, Food & Rural Affairs, 2011).


3.2.2. SCOTTISH MARINE POLICY

3.2.2.1. Scottish National Marine Plan

The Scottish National Marine Plan (NMP), published in March 2015, provides a strategic framework for the sustainable management of Scotland’s marine resources up to 200 nm offshore (Scottish Government, 2015). Aligned with the UK MPS (Department for Environment, Food & Rural Affairs, 2011), the NMP balances development with environmental protection and supports efficient consenting processes and grid planning.

For offshore wind, the NMP promotes development in suitable locations, contributes to decarbonisation and renewable energy targets, and emphasises economic benefits through local supply chains. It provides essential guidance for navigating planning and regulatory requirements while ensuring alignment with Scotland’s climate and energy goals.

The second iteration of the National Marine Plan (NMP2) is currently under development, building on lessons learned from a 2021 review (Scottish Government, 2021). The updated plan aims to address significant changes, such as Scotland’s net-zero commitments, advancements in marine technology, and the evolving policy landscape. NMP2 is expected to enhance marine planning to support offshore wind and other sustainable developments while integrating the Blue Economy approach and responding to the global climate emergency. In 2023, it was highlighted in the First Ministers Policy Prospectus that by 2026 the NMP2 will be published and will begin to be implemented (Scottish Government, 2023). Additionally, the Scottish Government published a Planning Position Statement in November 2024 that summarised the progress in developing NMP2 (Scottish Government, 2024).

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3.2.2.2. Sectoral Marine Plan for Offshore Wind Energy

The SMP for Offshore Wind aims to identify sustainable areas for the future development of commercial-scale offshore wind energy in Scotland, including deep water wind technologies, and covers both Scottish inshore and offshore waters (extending out to the Exclusive Economic Zone (EEZ) limit) (Scottish Government, 2020a).

Through the provision of a spatial strategy to inform the seabed leasing process for commercial offshore wind energy in Scottish waters, the SMP seeks to contribute to the achievement of Scottish and UK energy and climate change policy and targets. The plan seeks to:


- Minimise the potential adverse effects on other marine users, economic sectors and the environment resulting from further commercial-scale offshore wind development
- Maximise opportunities for economic development, investment, and employment in Scotland, by identifying new opportunities for commercial scale offshore wind development, including deeper water wind technologies

The SMP identified sustainable options for the future development of commercial-scale offshore wind energy in Scotland, including the N2 PO in which the Array Area is located.

The SMP is undergoing an update to reflect Scotland's evolving offshore wind ambitions and planning framework, particularly in support of the ScotWind and Innovation and Targeted Oil and Gas (INTOG) leasing rounds. Consultation on a draft updated SMP began in Autumn 2024, with adoption of the final plan anticipated by Spring 2025. The updated SMP will aim to enhance the planning, licensing, consenting, and strategic compensation processes, addressing long-term requirements such as wet storage areas to support the sustainable growth of Scotland's offshore wind sector. While this updated plan is being prepared, the Scottish Government has confirmed that licensing and consenting applications for offshore wind developments may continue to progress, ensuring minimal disruption to current and future projects.

3.3. CONSENTING PROCESS AND ASSOCIATED LEGISLATION

The generating infrastructure associated with the Offshore Project is proposed to be situated within the Array Area which at its closest point to Cape Wrath is located approximately 27 km offshore, placing it within the Scottish Renewable Energy Zone and the Scottish Offshore Region. The Offshore Cable Corridor Area will partially be in the Scottish Offshore Region and will also comprise a section that traverses the Scottish Inshore Region to landfall. As the Offshore Project qualifies as a generating station with a capacity greater than 50 MW and involves the placement of infrastructure in/over the sea and on/under the seabed within both Scottish Inshore Region and the Scottish Offshore Region, it is subject to a range of consents, licences, and permissions:

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- A Section 36 consent under the Electricity Act 1989 for the construction, operation and maintenance of the offshore generating station element of the Offshore Project
- a Marine Licence(s) under the MCAA 2009 (applicable to Scottish Offshore Region being between 12 nm and 200 nm) for the installation of infrastructure within the Array Area and section of the export cable in the Offshore Cable Corridor Area that is located in the Scottish Offshore Region
- a Marine Licence(s) under the Marine (Scotland) Act 2010 (applicable to Scottish Inshore Region being between MHWS and 12 nm) for the section of the export cable in the Offshore Cable Corridor Area and section of the Array Area that are located in the Scottish Inshore Region
- a Safety Zone declaration during construction and operation under the Energy Act 2004
- a decommissioning scheme under Sections 105 to 114 of the Energy Act 2004

Each of these consents, licences and permissions are described below.

3.3.1. THE ELECTRICITY ACT 1989

Section 36 of the Electricity Act 1989 ('the Electricity Act') applies to proposals for the construction, extension or operation of an offshore electricity generating station whose capacity exceeds (or, when extended, will exceed) 50 MW within the Scottish Offshore Region (between 12 nm and 200 nm offshore).

As the Offshore Project meets this criteria, Section 36 consent will be required for the installation, operation, and maintenance of infrastructure required to generate electricity offshore.

3.3.2. THE MARINE AND COASTAL ACCESS ACT 2009


Under the MCCA 2009, which applies to the Scottish Offshore Region (between 12 nm and 200 nm offshore) where the Array Area and a portion of the Offshore Cable Corridor Area of Search are located, there is a requirement for a marine licence prior to the construction, alteration or improvement of any works or deposition of any object in or over the sea, or on or under the seabed.

3.3.3. THE MARINE (SCOTLAND) ACT 2010

Under the Marine (Scotland) Act 2010, which applies to the Scottish Inshore Region (between MHWS and 12 nm offshore) where a portion of the Offshore Cable Corridor Area of Search and Array Area are located, there is a requirement for a marine licence prior to the construction, alteration or improvement of any works or deposition of any object in or over the sea, or on or under the seabed.

3.3.4. THE ENERGY ACT 2004 (AS AMENDED)

Section 95 of the Energy Act 2004 (as amended) allows for the establishment of Safety Zones around OWFs. These zones are implemented where deemed necessary by Scottish Ministers to ensure the safety of offshore installations and surrounding activities. For the Offshore Project, applications for Safety Zones are anticipated to cover construction and significant maintenance activities.

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The Energy Act 2004 also mandates that offshore renewable energy installations within Scottish inshore waters develop a decommissioning programme, as outlined in Sections 105 to 114 (Scottish Government, 2022b). These programmes, which must be approved by Scottish Ministers, should detail standards for decommissioning, financial security provisions, residual liability management, and strategies for collaboration across the industry to ensure a comprehensive and responsible approach to the end-of-life phase of offshore installations.

3.4. ENVIRONMENTAL IMPACT ASSESSMENT LEGISLATION

The requirement for a Section 36 Consent and Marine Licences for the Offshore Project triggers the need to consider if an EIA is required under the following EIA Regulations:

- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017
- The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017
- The Marine Works (Environmental Impact Assessment) Regulations 2007


3.4.1. THE ELECTRICITY WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017 (AS AMENDED)

Under the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, an EIA is required for the undertaking of any development to provide a generating station which is likely to have significant effects on the environment. With regard to applicability of the regulations to the Offshore Project, in virtue of its nature, size and location, the Offshore Project is likely to have significant effects on the environment. The Applicant is therefore planning to submit an Offshore EIAR to support the Section 36 Consent application (see Regulations 1 and 6(2)(b) of the 2017 Regulations).

3.4.2. THE MARINE WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) REGULATIONS 2007 & THE MARINE WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017 (AS AMENDED)

Under the MCAA 2009 Scottish Ministers (in practice MD-LOT as the executive agency) are responsible for marine licensing and enforcement in the Scottish Offshore Region (12- 200 nm). A marine licence will be required for the infrastructure forming part of the Offshore Project that is located in the Scottish Offshore Region. As the Offshore Project constitutes “EIA” development, this licence application will be subject to compliance with the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended).

Under the Marine Scotland Act 2010, the Scottish Ministers (MD-LOT in practice) are responsible for marine licensing and enforcement in the Scottish Inshore Region (between MHWS and 12 nm). A marine licence will be required for the infrastructure forming part of the Offshore Project that is located in the Scottish Inshore Region. As part of an “EIA development”, this licence application will be subject to compliance with the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

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3.4.3. THE MARINE LICENSING (PRE-APPLICATION CONSULTATION) (SCOTLAND) REGULATIONS 2013

The Marine Licensing (Pre-application Consultation (PAC)) (Scotland) Regulations 2013, commonly referred to as the PAC Regulations, apply to certain activities occurring within the Scottish Inshore Region (between MHWS and 12 nm). For the Offshore Project, the PAC Regulations are triggered by the installation of offshore export cables exceeding 1,853 m in length across the intertidal boundary (i.e. from MHWS to MLWS).

3.5. NATURE CONSERVATION LEGISLATION AND POLICY

3.5.1. THE HABITATS REGULATIONS

The European Union (EU) Habitats Directive (Council Directive 92/43/EEC) and certain elements of the Wild Birds Directive (Directive 2009/147/EC) (known together as the Nature Directives) have been transposed into UK legislation under the following pieces of legislation ('the Habitats Regulations'):


- The Conservation (Natural Habitats, &c) Regulations 1994 (as amended)
- The Conservation of Habitats and Species Regulations 2017 (as amended)
- The Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended)

3.5.2. EUROPEAN PROTECTED SPECIES

The European Habitats Directive (EU Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora) is implemented by the Habitats Regulations in Scotland, under which protection of European Sites that are internationally important for threatened habitats and species and a legal framework for EPS is established. Under Annex IV of the Habitats Directive, certain species are protected across their entire European range; the species from Annex IV whose natural range includes any area in Great Britain is listed under Schedule 2 of the Habitats Regulations in Scotland as EPS. Certain activities that could otherwise disturb or harm EPS may be legally permitted under an EPS Licence, as outlined below:

- Within Scottish inshore waters an EPS Licence may be required under the Conservation (Natural Habitats, &c) Regulations 1994 (as amended) if activities risk harming or disturbing EPS. MD-LOT on behalf of Scottish Ministers is the licensing authority (for purely marine species as outlined under regulation 44(2)(e) to (f)).
- Within Scottish offshore waters an EPS Licence may be required under the Conservation of Habitats and Species Regulations 2017 (as amended) for activities that risk harming or disturbing EPS. MD-LOT is the licensing authority.

The Applicant will apply for EPS Licences for all works that are deemed to require a licence throughout the Offshore Project lifetime. Should additional pre-construction licences be required (e.g., survey works and UXO clearance), these will be discussed and agreed with the relevant consenting authority as appropriate.

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4. PROPOSED APPROACH TO EIA

4.1. INTRODUCTION

This chapter describes:

- The methodology to be applied to assess potential project impacts (as defined in EIA Legislation; see Chapter 3: Policy and Legislation)
- The approach to cumulative effects, inter-related effects and transboundary effects
- The approach to certain technical topics
- The approach to the HRA and Marine Protected Area (MPA) assessment


The overall EIA process is delivered through a number of clearly defined stages, namely scoping, EIA, planning and monitoring. The Offshore Project qualifies as requiring an EIA under the Electricity Works (EIA) (Scotland) Regulations 2017, the Marine Works (EIA) (Scotland) Regulations 2017 and the Marine Works (EIA) Regulations 2007. The approach will follow guidance from the Institute of Environmental Management and Assessment (IEMA), particularly the “Environmental Impact Assessment Guide to: Shaping Quality Development” (2015) and NatureScot (2018), “A handbook on Environmental Impact Assessment: Guidance for competent authorities, consultees and others involved in the Environmental Impact Assessment process in Scotland”.

4.1.1. BASELINE AND STUDY AREAS

Baseline conditions of the areas covered by Offshore Project components are determined through characterisation of the pre-existing environment, including identification and evaluation of the associated topic/receptor-specific study areas for the issues scoped into the Offshore EIAR. This is accomplished through the following:

- Characteristics of sensitive receptors (e.g., range and mobility) and study areas are identified for the topic-specific assessments
- Review of publicly available data/information
- Identification and review of potential project impacts
- Consideration of data adequacy and sufficiency
- If the available data is inadequate/insufficient, specific data is gathered in order to fill key data gaps
- Review of acquired data and confirm fit-for-purpose to characterise baseline

This will include characterisation of the future baseline which is described as the likely evolution of the baseline scenario without the implementation of the Offshore Project, as far as natural changes from the

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baseline scenario could be assessed, with reasonable effort, based on the availability of relevant information and scientific knowledge. This will include the future receiving environment, based on the climate change projection scenarios selected for the Offshore Project, and will be outlined in each technical chapter.

4.2. ASSESSMENT OF POTENTIAL IMPACTS

The Offshore EIAR will assess the level of significance of effect expected to result from the Offshore Project, for those potential impacts scoped into the Offshore EIAR, utilising best practice EIA methodology. EIA guidance and methodologies will be utilised where appropriate for each topic area and will be detailed within the individual assessments. To assess the significance of impacts pre-mitigation, either adverse, neutral or beneficial environmental impacts will be determined. The assessment will be based on both the potential magnitude of change caused by an impact ('impact magnitude') arising from the Offshore Project and the sensitivity of relevant receptors; designed in mitigation measures will then also be considered alongside these components. The assessment will account for various types of impacts, including direct, indirect, secondary, cumulative, and inter-related impacts, ensuring a comprehensive evaluation of potential effects on baseline conditions.

Figure 4-1 outlines the process of assessing significant effects.

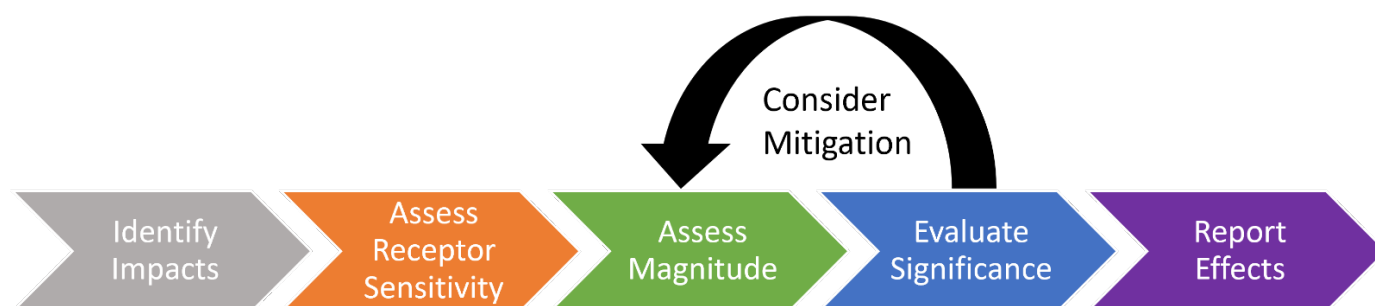



Figure 4-1 Assessment of Effects Process

4.2.1. RECEPTOR SENSITIVITY

Identifying a receptor's adaptability, tolerance and recoverability from potential impacts is critical in assessing its sensitivity to the considered impact. Sensitivity will be classed as:

- Negligible
- Low
- Medium
- High

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Where value or importance is attributed to receptors through legal designation or protection, relevant receptor-specific guidance will be used to assess the level of sensitivity.

4.2.2. IMPACT MAGNITUDE

Impact magnitude considers extent, duration, frequency and reversibility of the impact. The categorisation of impact magnitude varies for specific pathways, receptors and technical assessment. However, the categorisation will broadly follow:

- Negligible: any change would be negligible, unnoticeable, or there are no predicted changes
- Low: minor change to key features/elements of the baseline conditions
- Medium: partial change to key features/elements of the baseline conditions
- High: significant changes or total alteration to key features/elements of the baseline conditions

Impact magnitude definitions will be defined for both adverse and beneficial effects.

4.2.3. SIGNIFICANCE EVALUATION

In order to ensure consistency in defining the significance of effect, a matrix approach is used which draws on established EIA guidance (NatureScot, 2018), as per Table 4-1. A combination of the impact magnitude and sensitivity of the receptor will determine the significance of a beneficial or adverse effect.

The categorisation of the levels of effect provides a threshold in EIA terms to determine whether or not significant effects may result from the Offshore Project. As highlighted in yellow and orange (Table 4-1), a level of effect of Moderate or Major (respectively) is typically considered 'significant' in EIA terms. Certain topics may determine that an effect is 'not significant' despite level of effect being Moderate based on professional judgement. If applicable, these cases will be explained and justified in the relevant technical chapter.

Table 4-1 Significance of Effect Evaluation Matrix

Sensitivity of receptor	Impact Magnitude				
		Negligible	Low	Medium	High
	Negligible	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Negligible	Minor	Minor
	Medium	Negligible	Minor	Moderate	Moderate
	High	Negligible	Minor	Moderate	Major

A broad definition of effect significance categories is outlined in Table 4-2.


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Table 4-2 Broad Definition of Effect Significance Categories

Effect significance category	Definition
Major	A fundamental change to the environment or receptor, resulting in a significant effect.
Moderate	A material, but non-fundamental change to the environment or receptor, resulting in a possible significant effect.
Minor	A detectable, but non-material change to the environment or receptor resulting in no significant effect.
Negligible	No detectable change to the environment or receptor resulting in no significant effect.

Based on industry best practice, guidance and specialist knowledge specific to the topic in question, topic specific definitions of impact magnitude, sensitivity and significance will be defined within the Offshore EIAR where required.


Additional mitigation measures (in addition to any designed in mitigation already incorporated into the project design) or further design changes will be incorporated into the Offshore EIAR, where an aspect of the Offshore Project may result in a significant effect. Designed in (or embedded) mitigation refers to measures that are integral to the project design from the outset, such as layout modifications to reduce impacts on sensitive receptors. In contrast, additional mitigation measures are applied after identifying potential impacts to further avoid or reduce effects to acceptable levels.

The impact will be reassessed following application of the additional mitigation measures in order to determine the residual effect.

4.3. CUMULATIVE EFFECTS

A Cumulative Effects Assessment (CEA) considers impacts arising cumulatively with other relevant plans, projects and activities resulting in cumulative effects, rather than considering impacts from the Offshore Project alone, in line with the legal requirements of the relevant EIA Regulations. Each topic assessment within the Offshore EIAR will consider cumulative effects and provide a topic-specific CEA section where required.

The CEA will consider other developments and activities that are 'reasonably foreseeable'. These will be permitted applications that are not yet implemented, submitted applications awaiting determination with design information in the public domain, and potentially include existing developments already built or in construction. Projects that are built and operational during baseline site characterisation are considered to be part of the baseline for the CEA. However, where ongoing impacts from built and operational projects

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are identified, these will be considered within the CEA. For partially constructed or recently commissioned projects, the full extent of the impacts arising from the development(s) may not be known and therefore will be included within the CEA.

Project types will include, but are not limited to:


- OWFs and all associated infrastructure (including other ScotWind OWFs where applicable)
- Cable installations
- CCS
- Oil and gas installations and pipelines
- Seismic surveys
- Coastal developments (i.e. ports and harbours)
- Aggregate extraction areas
- Licensed dredging disposal sites

Up-to-date publicly available information in relation to all other relevant plans, projects and activities will be considered in the CEA. The temporal and spatial extent of impacts which may be associated with particular phases of the Offshore Project will be included within the CEA, encompassing all topic-specific study areas, presenting an understanding of how such impacts may overlap with other projects and plans.

There is a level of uncertainty with respect to the potential cumulative effects that may arise, as not all proposed projects or activities will take place or happen as described. The level of uncertainty is dependent on which phase the projects or activities are currently at, which will be considered when drawing conclusions on cumulative effects and completing the CEA.

The HRA process will consider the potential in combination effects on European designated sites; these effects will be assessed using the same approach as the CEA⁷. The HRA process is discussed further in Section 4.6.3.

⁷ In combination effects, assessed as part of the HRA, refer to the potential combined impacts of the proposed project with other plans or projects on European designated sites (e.g., SACs and SPAs). This differs from cumulative effects, considered in the Cumulative Effects Assessment (CEA), which examine the combined impacts of the proposed project with other relevant plans and projects on all receptors, not just European designated sites. While similar in approach, the terminology reflects the specific focus of each assessment process.

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4.4. INTER-RELATED EFFECTS

Inter-related effects will be considered in the Offshore EIAR. Inter-related effects include potential effects that occur throughout more than one phase of the project lifetime (i.e. during construction, operation and decommissioning) upon a receptor, including effects that may overlap spatially and/or temporally. This will ensure that the Offshore Project as a whole is appropriately considered within the Offshore EIAR.

4.5. TRANSBOUNDARY EFFECTS

Transboundary effects arise when impacts from a development within one European Economic Area (EEA) state's territory affects the environment of another EEA state(s). Where significant transboundary effects are potentially identified, Scottish Ministers must provide information about a development to the government of the affected EEA state⁸ and invite them to participate in consultation procedures. Transboundary impacts will be identified and considered in the Offshore EIAR in accordance with the relevant EIA Regulations.

4.6. ADDITIONAL EIA MATTERS


4.6.1. APPROACH TO MAJOR ACCIDENTS AND DISASTERS

Any direct or indirect effects relating to climate, and any effects arising from the vulnerability of the Offshore Project to Major Accidents and Disasters will be considered within the Offshore EIAR, in accordance with the relevant EIA Regulations requirements.

Although a standalone Offshore EIAR chapter on the topic of major accidents and disasters is not proposed, risk of environmental disasters to the Offshore Project and any associated control measures to mitigate any potential accidents or events will be considered within the following Offshore EIAR chapters (refer to Chapter 7: Proposed Offshore EIAR Structure for the proposed structure of the Offshore EIAR):

- Chapter 6.1: Physical and Coastal Processes
- Chapter 6.10: Commercial Fisheries
- Chapter 6.11: Shipping and Navigation
- Chapter 6.12: Radar and Aviation
- Chapter 6.13: Offshore Infrastructure, Other Sea Users, Tourism and Recreation
- Chapter 6.15: Climate

⁸ As applicable under Regulation 18 (1)(a) of the Marine Works (Environmental Impact Assessment) Regulations 2007 and Regulation 29 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

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The Offshore Project will be designed to operate within its environment, including during extreme environmental conditions. The likelihood of a natural disaster damaging infrastructure and leading to consequential significant environmental effects is considered to be negligible, as the Offshore Project will be designed in compliance with regulatory standards and to withstand the environment in which it is located. Appropriate guidance, including the recent IEMA 'Major Accidents and Disasters in EIA: A Primer' (IEMA, 2020), will be utilised in order to better understand the likelihood of an occurrence and the Offshore Project's susceptibility to potential major accidents and disasters.


4.6.2. APPROACH TO WASTE

An outline Site Waste Management Plan (SWMP) will be included within the Construction Environmental Management Plan (CEMP) and Project Environmental Management Plan (PEMP). The purpose of the outline SWMP will be to outline the procedures for handling waste material and set out the practices to be put in place in order to ensure the control of waste on site, in a matter that does not compromise the local and wider environment, encompassing the minimisation and removal of waste from site where necessary. The full SWMP will be secured by condition prior to construction when further detailed design information becomes available to inform the plan. The measures proposed within the full SWMP will ensure compliance with the Duty of Care Responsibilities as set out in Section 34 of the Environmental Protection Act 1990 as amended by the Waste (Scotland) Regulations 2012. The full SWMP will also be prepared in accordance with the Environment Act 1995.

The full SWMP will describe and quantify the waste types arising from the Offshore Project activities and how these will be managed, i.e., reused, recycled, recovered or disposed of in line with the waste hierarchy. Additionally, the full SWMP will provide information on the management arrangements for the identified waste types and associated management facilities to be used by the Offshore Project. The contents of the full SWMP should include a strategy for waste reduction, development waste management specifics, organic matter management, storage of waste and waste minimisation measures. On this basis the potential impact arising from waste during construction and operations and maintenance is unlikely to be significant and is proposed to be scoped out of the Offshore EIAR.

4.6.3. APPROACH TO HRA

As adopted in 1992, The Council Directive 92/43/EEC ('the Habitats Directive') on the Conservation of Natural Habitats and of Wild Fauna and Flora provides for the conservation and restoration of natural habitats and wild species listed in Annexes, including in offshore areas. This protection was granted through the designation of SACs and measures to protect EPS. The European Directive (2009/147/EC) on the Conservation of Wild Birds ('the Birds Directive') provides protection to rare and vulnerable species listed under Annex I of the Birds Directive, through the designation of Special Protection Areas (SPAs). Collectively SACs and SPAs are referred to as European sites. Various regulations, collectively known as the Habitats

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Regulations, were transposed into Scottish law from the aforementioned Directives. Those regulations relevant to the Offshore Project include:

- the Conservation (Natural Habitats &c.) Regulations 1994 (as amended)
- the Conservation of Habitats and Species Regulations 2017
- the Conservation of Offshore Marine Habitats and Species Regulations 2017

All competent authorities must consider whether any plan or project could affect a European site before it can be carried out, including whether or not it will have a likely significant effect as defined by the Habitats Regulations; this process is known as HRA. There are 4 stages included within the HRA process, including:

1. Screening
2. Appropriate Assessment (AA)
3. Assessment of Alternative Solutions and Imperative Reasons of Overriding Public Interest (IROPI)
4. Compensatory Measures

NatureScot must be consulted as part of any AA process. If the AA identifies an adverse effect on the integrity of a European site, the plan or project can only proceed if there are no alternative solutions, IROPI is applicable, and compensatory measures have been secured.

The Offshore HRA Screening Report was issued as a separate document alongside this Offshore Scoping Report.


4.6.4. APPROACH TO NCMPA ASSESSMENT

Nature Conservation Marine Protected Areas (NCMPAs) are designated under Section 126 (s.126) of the MCAA 2009, where MD is the regulatory authority (acting on behalf of Scottish Ministers – pursuant to s.20-64, s.82-86, and s.91 of the Marine (Scotland) Act 2010).

The potential risk (the 'Likely Significant Risk' (LSR)) for adverse effects associated with a project that may affect NCMPA protected features, is considered within the NCMPA Risk Assessment. Based on guidance as provided by the Marine Management Organisation (MMO) for Marine Conservation Zone (MCZ) Assessments within English waters, a similar methodology for the NCMPA Assessment process can be adopted. The process has three sequential stages comprising: Screening; Stage 1 Assessment; and Stage 2 Assessment.

1. Stage 1 Assessment

The extent of the potential impact of the plan or the project on the NCMPA is considered under the Stage 1 Assessment. The LSR of activities associated with the plan or the project is examined under Stage 1, and

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whether it may cause an effect on the protected features of an NCMPA and may either cause or is capable of affecting (other than insignificantly) any ecological or geomorphological processes on which the protected feature is dependent.

LSR should be considered in terms of whether it hinders the achievement of conservation objectives, or maintenance or achievement of favourable status for the site (i.e., impacts the site so that the features are no longer in a favourable condition or prevent the features from recovering to a favourable condition). The project will proceed to be considered under Stage 2 of the assessment process if mitigation to reduce identified impacts cannot be secured, and there are no other alternative locations.

2. Stage 2 Assessment

The socioeconomic impact of the plan or project, together with the risk of environmental damage is considered under the Stage 2 Assessment. There are 2 parts to the Stage 2 Assessment process:

- *"Does the public benefit in proceeding with the project clearly outweigh the risk of damage to the environment that will be created by proceeding with it?", and, if so:*
- *"Can the applicant satisfy that they can secure, or undertake arrangements to secure, measures of equivalent environmental benefit for the damage the project will have on the NCMPA features?"*.


The NCMPA Risk Assessment will be completed alongside the Offshore EIAR.

4.7. REFERENCES

IEMA (2015) Environmental Impact Assessment Guide to: Shaping Quality Development. Accessed online at: [IEMA Guidance Documents EIA Guide to Shaping Quality Development V6.pdf](#) [Accessed November 2024].

IEMA (2020) Major Accidents and Disasters in EIA: An IEMA Primer. Accessed online at: [IEMA - Institute of Environmental Management and Assessment](#) [Accessed October 2024].

NatureScot (2018) Environmental Impact Assessment Handbook: Guidance for Competent Authorities, Consultation Bodies and Others Involved in the Environmental Impact Assessment Process in Scotland. Accessed online at: [Wayback Machine](#) [Accessed November 2024].

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5. CONSULTATION

5.1. STAKEHOLDER CONSULTATION OVERVIEW

Effective stakeholder consultation is a critical component of the development of any project, throughout its project lifecycle. Consultation provides an opportunity for regulator, stakeholder and public feedback to be incorporated into the project decision-making process. All statutory consultation requirements, as outlined in Chapter 3: Policy and Legislation, will be adhered to by the Applicant.

A Project website (www.havbredey.co.uk) has been created to inform stakeholders and the public about the Project, including information about the Project, current timeline and Project news. Contact details for the Project are also provided.

The following section details the consultation that has occurred to date, along with an overview of planned consultation activities, following submission of this Offshore Scoping Report.

5.2. STAKEHOLDER IDENTIFICATION

Stakeholder identification for the Project is ongoing and will be revisited throughout the Offshore EIAR development. Preliminary stakeholder identification has been undertaken and stakeholders within the following groups have been identified:

- Regulatory and Government Bodies
- Statutory Consultees and Industry Bodies
- Environmental and Conservation Non-Government Organisations (NGOs)
- Marine and Fisheries Stakeholders
- Local Community and Wider Stakeholders

5.3. CONSULTATION TO DATE

5.3.1. INITIAL ENGAGEMENT

Project information emails were sent to a number of identified stakeholders to introduce the development team working on the Havbredey Offshore Wind Farm and to provide some initial information on the Offshore Project and its timescales prior to scoping. The identified stakeholders were provided with contact details for the development team and invited to raise questions and make additional information requests. Table 5-1 provides a list of stakeholders contacted and the date of first contact during this initial engagement.

In addition, the Applicant has regular quarterly online meetings with MD, NatureScot, and CES.



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Table 5-1 Initial Engagement

Date	Stakeholder
October 2024	Whale and Dolphin Conservation (WDC)
October 2024	The Highland Council
October 2024	Scottish Environment Protection Agency (SEPA)
October 2024	Comhairle nan Eilean Siar
October 2024	Royal Society for the Protection of Birds (RSPB)
October 2024	Hebridean Whale and Dolphin Trust (HWDT)
October 2024	Visit Scotland
October 2024	MD
October 2024	NatureScot
October 2024	Outer Hebrides Fisheries Trust
October 2024	Fisheries Management Scotland
October 2024	Western Isles Fishermans Association
December 2024	Civil Aviation Authority (CAA)
December 2024	Outer Hebrides Chamber of Commerce
December 2024	Caithness Chamber of Commerce
December 2024	Crofting Commission
December 2024	Highland and Island Enterprise
December 2024	Highlands and Islands Airports (HIAL)
December 2024	Historic Environment Scotland (HES)
December 2024	Ministry of Defence (MoD), Defence Safeguarding
December 2024	National Air Traffic Services (NATS)
December 2024	National Grid
December 2024	National Trust for Scotland
December 2024	Northern Lighthouse Board
December 2024	The Maritime and Coastguard Agency (MCA)
December 2024	Royal National Lifeboat Institute (RNLI)
December 2024	Royal Yachting Association (RYA) Scotland
December 2024	Scottish Canoe Association
December 2024	Scottish Crofting Federation
December 2024	Scottish Surfing (formerly Scottish Surfing Federation)
December 2024	Scottish Water
December 2024	Scottish Wildlife Trust (SWT)
December 2024	Scotways
December 2024	Sport Scotland
December 2024	Surfers Against Sewage

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Date	Stakeholder
December 2024	Transport Scotland
December 2024	UK Chamber of Shipping

5.3.2. INITIAL FISHERIES ENGAGEMENT


Offshore Project information emails were also sent to a number of identified fisheries stakeholders to introduce the Project team and invite them to a scoping workshop held in January 2025 (see Section 5.3.3). Fisheries stakeholders were invited to participate in the scoping workshop as an opportunity for initial engagement with the Project team and to provide their feedback on the scoping assessment. Table 5-2 provides a list of fisheries stakeholders contacted and the date of first contact during this initial engagement.

Table 5-2 Initial Fisheries Engagement

Date	Stakeholder
November 2024	Anglo North Irish Fish Producers Organisation
November 2024	Association of District Salmon Fisheries Board
November 2024	Atlantic Salmon Trust
November 2024	Caithness District Salmon Fisheries Board
November 2024	Comité National des Pêches
November 2024	Coastal Shellfish Ltd
November 2024	Comité Régional des Pêches Maritimes et des Élevages Marins de Nouvelle-Aquitaine
November 2024	Communities Inshore Fisheries Alliance (CIFA)
November 2024	Comité Régional des Pêches Maritimes et des Élevages Marins de Nord Pas-de-Calais
November 2024	Danish Fishermen's Producer Organisation
November 2024	Danish Fishermen's Association
November 2024	Danish Pelagic Producers Organisation
November 2024	Dartmouth Crab Company
November 2024	Deutscher Fischerei Verband
November 2024	Ebony May SY33
November 2024	Erzeugergemeinschaft der Nord und Ostseefischer GmbH / German North Sea and Baltic Producers Association
November 2024	Finnøy Fiskeriselskap AS
November 2024	Fisheries Management Scotland
November 2024	Irish Fish Producers Organisation
November 2024	Independent Shellfisherman's Co-operative Ltd
November 2024	Inshore Fishery Groups

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Date	Stakeholder
November 2024	Irish South and East Fish Producers Organisation
November 2024	Killybegs Fish Producers Organisation Ltd
November 2024	Kilo Shellfish
November 2024	Mallaig and Northwest Fishermen's Association
November 2024	Nederlande Vissersbond
November 2024	Netherlands Fishermens Association
November 2024	Nordfjord Havn / Port of Nordfjord
November 2024	North and East Coast Regional Inshore Fisheries Group
November 2024	North and West District Salmon Fishery Board
November 2024	North Atlantic Fishing Company
November 2024	North West Coast Regional Inshore Fisheries Group
November 2024	Northeast Fishermen's Training Association
November 2024	Northern District Salmon Fisheries Board
November 2024	Northern Ireland Fish Producers Organisation
November 2024	Norwegian Fishermen's Association (Sør-Norges Trålerlag)
November 2024	Norwegian Fishing Vessel Owners Association (Fiskebat)
November 2024	Orkney Fishermen's Society
November 2024	Orkney Crab
November 2024	Orkney Fisheries Association
November 2024	Orkney Fishermen's Society
November 2024	Orkney Islands Sea Angling Association
November 2024	Osprey
November 2024	Outer Hebrides Fisheries Trust
November 2024	Outer Hebrides Inshore Fisheries Group
November 2024	Outer Hebrides Regional Inshore Fisheries Group
November 2024	Perseverance
November 2024	Pesca España
November 2024	Rederscentrale
November 2024	Scottish Creel Fisherman's Federation
November 2024	Scottish Fishermen's Federation (SFF)
November 2024	Scottish Fishermen's Organisation (SFO)
November 2024	Scottish Pelagic Fishermen's Association (SPFA)
November 2024	Scottish Salmon Producers Association
November 2024	Scottish White Fish Producers Association (SWFPA)
November 2024	Seafood Scotland
November 2024	Serene Fishing Vessel

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Date	Stakeholder
November 2024	Shetland Anglers Association
November 2024	Shetland Fish Producer's Organisations
November 2024	Shetland Fishermen's Association
November 2024	Shetland Shellfish Management Organisation
November 2024	Shetlands Training Fishermen's Association
November 2024	Stornoway Razor Fisherman
November 2024	Swedish Fishermen's Producer Organisation
November 2024	Swedish Pelagic Federation Producer Organisation
November 2024	The SWFPA
November 2024	VisNed Netherlands Fishermen's Federation
November 2024	West Sutherland Fisheries Trust
November 2024	Western Isles District Salmon Fishery Board
November 2024	Western Isles Fisherman's Association
November 2024	Whitby Commercial Fishing Association

5.3.3. SCOPING WORKSHOPS


Scoping workshops were held by the Applicant in January 2025 to inform this Offshore Scoping Report. A total of four scoping workshops were held, covering eight technical topics. The invited stakeholders were provided with a topic-specific briefing pack prior to each workshop. Topic specific briefing packs summarised the following:

- Proposed study area(s)
- Baseline data sources
- Baseline environment
- Impacts proposed to be scoped into and out of the Offshore EIAR
- Proposed designed in mitigation measures
- Proposed EIA methods and further site-specific surveys (if applicable)

Scoping workshop invitees were also provided with a project overview briefing pack that summarised key design elements of the Offshore Project.

Table 5-3 summarises the scoping workshops including:

- Date held
- Technical topics covered
- Stakeholder attendance
- Key comments

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- Actions taken by the Project team

The summary in Table 5-3 focusses on reporting on substantive changes identified as part of the initial consultation work that have influenced the approach to assessment.




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Table 5-3 Scoping workshop summary


Workshop (date)	Technical Topic(s)	Attendees	Key Comments	Status
1 (16 th January 2025)	Physical and Coastal Processes Benthic and Intertidal Ecology Fish and Shellfish Ecology	<p>Attendees:</p> <p>MD-LOT</p> <p>Marine Directorate – Science Evidence, Data and Digital (MD-SEDD)</p> <p>JNCC</p> <p>NatureScot</p> <p>Regrets:</p> <p>Outer Hebrides Fisheries Trust</p> <p>The Highland Council</p>	<ol style="list-style-type: none"> MD-SEDD provided additional data sources relating to stratification for consideration with the Offshore EIAR assessment. MD-SEDD noted the EIA consultant should focus on qualitative assessment for timings/seasonal stratification, utilising published literature, coupled with stratification models/assessment. NatureScot noted that micro-siting as a mitigation measure should be added to the benthic assessment and should be consistent between scoping chapters. NatureScot advised to consider OneBenthic dataset and JNCC advised to include the Annex 1 reef polygon layer within the Offshore Scoping Report. NatureScot advised the following: 	<ol style="list-style-type: none"> Data sources included within the Physical and Coastal Processes chapter (see Chapter 6.1: Physical and Coastal Processes) Text reflective of this method has been included within the EIA scoping assessment table in the Physical and Coastal Processes chapter (see Chapter 6.1: Physical and Coastal Processes) Micro-siting has been added to the designed in measures table in the Benthic and Intertidal Ecology chapter (see Chapter 6.5: Benthic and Intertidal Ecology) Consideration of this dataset has been included within the Benthic and Ecology chapter (see Chapter 6.5: Benthic and Intertidal Ecology) Impact pathways noted by NatureScot have been scoped into

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Workshop (date)	Technical Topic(s)	Attendees	Key Comments	Status
			<ul style="list-style-type: none"> Include impact of colonisation of hard structure/creation of potential habitat, and removal of habitat at the decommissioning stage Scoping in Invasive Non-Native Species (INNS) at construction and decommissioning, due to potential pathways from vessel movements and infrastructure Scoping in impacts to benthic receptors due to physical processes <p>6. NatureScot noted although eDNA is not a requirement, it is often used to detect rare species.</p> <p>7. NatureScot stated to distinguish between primary and secondary entanglement as an impact pathway.</p> <p>8. NatureScot stated to assess diadromous fish within the Offshore EIAR process only, and not within the HRA process.</p>	<p>the Benthic and Intertidal Ecology assessment (see Chapter 6.5: Benthic and Intertidal Ecology)</p> <p>6. Noted.</p> <p>7. Entanglement impacts have been separated into primary and secondary entanglement.</p> <p>8. Diadromous fish will be assessed within the Offshore EIAR process only, and not within the HRA process.</p>
2	Underwater Noise	Attendees:	1. NatureScot advised underwater noise impacts during the decommissioning	1. Potential underwater noise impacts during the decommissioning phase of

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Workshop (date)	Technical Topic(s)	Attendees	Key Comments	Status
(14 th January 2025)	Marine Mammals and Other Megafauna Marine and Intertidal Ornithology	MD-LOT Whale and Dolphin Conservation RSPB NatureScot	<p>phase of the Offshore Project are scoped into the assessment.</p> <ol style="list-style-type: none"> NatureScot advised the base swim speeds from Scottish Natural Heritage (SNH) (now known as NatureScot) 2016 are to be considered (as a minimum) within the underwater noise Offshore EIAR assessment. NatureScot provided additional data sources relevant to the Marine Mammal and Other Megafauna scoping chapter. NatureScot advised to scope in humpback whales, long fin pilot whales, fin whales, beaked whales, turtles, species with fewer observations, and any other species observed in the latest site-specific digital aerial surveys (DAS), to the Offshore EIAR assessment. NatureScot advised that entanglement impacts should be split into primary 	<p>the Offshore Project are scoped into the underwater noise assessment (see Chapter 6.2: Underwater Noise).</p> <ol style="list-style-type: none"> The SNH 2016 base swim speeds have been added to the Offshore EIAR methodology (see Chapter 6.2: Underwater Noise). Data sources shared have been considered and incorporated into the Offshore Scoping Report (see Chapter 6.7: Marine Mammals and Other Megafauna). Humpback whales, long-finned pilot whales, fin whales and beaked whales have been included in the Offshore Scoping Report baseline. Additional species recorded within the latest site-specific DAS will be considered within the Offshore EIAR. Entanglement impacts have been separated into primary and secondary entanglement (see Table 6.7-5 in

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Workshop (date)	Technical Topic(s)	Attendees	Key Comments	Status
			<p>and secondary entanglement, with consideration to additional mitigation.</p> <p>6. NatureScot noted to review year 2 site-specific DAS results when available for any additional ornithology species to be assessed at Offshore EIAR stage.</p> <p>7. NatureScot noted updated guidance and tools relevant to assessing ornithological impacts are due to be released in the near-term.</p>	<p>Chapter 6.7: Marine Mammals and Other Megafauna).</p> <p>6. Consideration will be given to the latest site-specific DAS results prior to the commencement of the EIA. The data will be assessed to update ornithology receptors as needed, ensuring the inclusion of sensitive receptors in Collision Risk Modelling (CRM). This has been added to the proposed approach to EIA and the assessment methodology sections in Chapter 6.8: Marine and Intertidal Ornithology.</p> <p>7. Project team will maintain awareness and remain up to date with latest EIAR assessment expectations.</p>
3 (21 st January 2025)	Seascape, Landscape and Visual Impact Assessment (SLVIA) (see Chapter 6.14: SLVIA)	Attendees: MD-LOT NatureScot The Highland Council	<p>1. The Highland Council suggested consideration of viewpoints from the A838 across the Moine peninsula, Cranstackie or Beinn Spionnadh, Ben Hope and Foinaven.</p>	<p>1. Additional viewpoints were added following advice from The Highland Council, including: viewpoint 7: A838 (Moine Peninsula); viewpoint 8: Ben Hope; viewpoint 9: Fionaven (Ceann</p>

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Workshop (date)	Technical Topic(s)	Attendees	Key Comments	Status
			<ol style="list-style-type: none"> The Highland Council suggested viewpoints that may not meet the threshold for significance in the EIA should still be scoped in. MD-LOT and NatureScot advised to consider the SMP Guidance and NatureScot guidance on aviation and lighting. It was requested that the ZTV be updated and provided at a higher resolution. 	<p>Garbh); and viewpoint 10: Beinn Spionnaidh.</p> <ol style="list-style-type: none"> Consideration will be given to further viewpoints at the EIA stage following further consultation, including viewpoints identified through consultation as being of particular interest to the public or stakeholders Additional guidance was added and will be considered at the EIA stage. The ZTV was updated and included on a 1:50k base map and at size A3
4 (15 th January 2025)	Commercial Fisheries (see Chapter 6.10: Commercial Fisheries)	Attendees: SPFA SWFPA, Mallaig and Northwest Association Anglo Northern Ireland Fish Producers Organisation (ANIFPO) North Atlantic Holdings	<ol style="list-style-type: none"> Fisheries stakeholders suggested inclusion of 10 years of MMO commercial fisheries data within the Offshore Scoping Report. Fisheries stakeholders questioned whether impacts to fish and shellfish, and socio-economic impacts to commercial fisheries were being assessed within the EIA 	<ol style="list-style-type: none"> MMO data sources were extended to cover a 10-year period, leading to updates in all figures, tables, and the overall scoping assessment. Socio-economic impacts to commercial fisheries will be assessed within the Socio-economics chapter of the EIA (see Chapter 6.16) and impacts to fish and shellfish species within the

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Workshop (date)	Technical Topic(s)	Attendees	Key Comments	Status
		SFF North and East Coast Regional Fishing Group CIFA The Highland Council MD-LOT	3. Fisheries stakeholder provided screenshots of additional VMS datasets that could potentially be used to inform the Offshore EIAR. 4. Fisheries stakeholder advised that impact pathway displacement of fishing vessels, and increased steaming times should include the decommissioning phase of the Offshore Project. Also advised the impact pathway obstacles on the seabed and in the water column should include the construction and decommissioning phase of the Offshore Project (see Chapter 6.10: Commercial Fisheries). 5. Additional data should be identified via further consultation, including non-UK fleet datasets, industry plotter data, inshore vessel data, as well as data from the Fisheries Sensitivity	Fish and Shellfish chapter (see Chapters 6.6). 3. The screenshots of additional VMS datasets could not be directly used in their existing format. However, the Project team will actively seek further information and data from the fisheries stakeholders, to assess their potential for inclusion in the Offshore EIAR, where possible. 4. Impact pathways were updated, whereby decommissioning is now scoped in for displacement of fishing vessels and increased steaming times, and construction and decommissioning has been scoped in for obstacles on the seabed and in the water column (see Chapter 6.10: Commercial Fisheries). 5. Additional data will be considered in the EIA where relevant following further consultation with the industry

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Workshop (date)	Technical Topic(s)	Attendees	Key Comments	Status
			Mapping and Displacement Modelling (FiSMaDiM).	to confirm availability and quality of additional datasets, including non-UK fleet datasets, industry plotter data, inshore vessel data and FiSMaDiM data.

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5.3.4. POST-WORKSHOP FEEDBACK

Stakeholders who were unable to attend the workshops or provide specific feedback during the sessions were given the opportunity to contribute additional written input after the workshop, within an agreed deadline. Where possible, additional feedback has been incorporated into the Offshore Scoping Report, including feedback received after the deadline. However, it was not possible to incorporate some post-workshop feedback provided after the deadline that was agreed within the workshops. In these instances, the feedback received will be considered within the Offshore EIAR.

5.4. FUTURE CONSULTATION

5.4.1. ONGOING ENGAGEMENT

The Applicant is fully committed to working in partnership and engaging with stakeholders throughout the development, construction, and operation of the Project. As the Project progresses, stakeholder engagement will continue and build upon the initial engagement (see Table 5-1 and Table 5-2) and the scoping engagement activities discussed above. Key stakeholder groups will include statutory consultees, regulatory bodies, NGOs, local authorities, community groups, and industry representatives.

During the EIA process, engagement will take place at key phases, such as prior to and during planned surveys and during preparation of the Offshore EIAR chapters, so that stakeholders have an opportunity to provide input and that any concerns can be considered in the assessment. Public engagement and engagement with statutory consultees will be undertaken in line with PAC requirements, with public events planned to provide updates on Offshore Project progress and gather feedback.


A dedicated Fisheries Liaison Officer (FLO) has been appointed for the Offshore Project to ensure ongoing communication with the fishing industry. Fisheries engagement will be conducted separately, with targeted discussions to address potential impacts and mitigation measures.

5.4.2. PRE-APPLICATION CONSULTATION


All statutory consultation requirements, as applicable under the consenting regime for the Offshore Project, will be carried out by the Applicant, including meeting the PAC requirements to undertake public consultation prior to the submission of licence application(s), as required under The Marine Licensing (PAC) (Scotland) Regulations 2013. The Applicant will also comply with applicable guidance and requirements for consulting on an application under Section 36 of the Electricity Act (1989).

5.4.3. POST-APPLICATION CONSULTATION

Statutory consultation on the marine licence and section 36 applications will be undertaken by the regulatory body following submission and validation of those applications. In addition, following the application submissions, engagement with relevant stakeholders will also continue so that feedback received during the determination stage and during the discharge of consent conditions ahead of

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construction can be addressed. Additional consultation and public events will be held by the Applicant as the Offshore Project progresses, including awareness-raising initiatives such as press releases, printed material (e.g. newsletters, leaflets) and notifications through the Project website, in order to reach a wider audience.

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6. OFFSHORE TECHNICAL TOPICS

6.1. PHYSICAL AND COASTAL PROCESSES

6.1.1. INTRODUCTION

This chapter of the Offshore Scoping Report provides an overview of the baseline environment for Physical and Coastal Processes within the Array Area and Offshore Cable Corridor Area of Search. It also includes a scoping assessment of likely significant effects for the relevant receptors, from the construction, operation (including maintenance), and decommissioning phases of the Offshore Project.

6.1.2. STUDY AREA

The Physical and Coastal Processes Study Area has been defined on the basis of the Offshore Project (see Figure 1-1), which includes the Array Area and Offshore Cable Corridor Area of Search, considered up to MHWS as the primary (or near-field) footprint for potential direct physical impacts on Physical and Coastal Processes receptors.

A secondary zone of influence, also known as far-field footprint, is generally anticipated to be in line with a full tidal excursion extent for the area, however understanding the dominant influences for the area is key and, as such, this may need to include the footprint of the predominant wave spectra and storm events. These extents will be reviewed and confirmed through scoping with input from stakeholders for the EIA. Together, the primary and secondary zones will form the Wider Physical and Coastal Processes Study Area.


6.1.3. BASELINE ENVIRONMENT

6.1.3.1. Data Sources

Data sources used to inform this Physical and Coastal Processes Chapter of the Offshore Scoping Report are presented in Table 6.1-1.

Table 6.1-1 Summary of Key Data Sources for Physical and Coastal Processes

Source	Spatial Coverage	Year	Summary
MD Data Portal	Scotland	2024	Geological Conservation Review (GCR) sites
		2023	Bathymetry
EMODnet	Europe	2024	Bathymetry, bedrock geology, coastal migration, geomorphology
		2019	


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Source	Spatial Coverage	Year	Summary
		2022	Multiscale Folk classification of Seabed Substrate European Nature Information System (EUNIS) Seabed Classification
		2009-2021	Bathymetry 4" resolution (approx. 60 m x 120 m)
		2024	Geological units (variable scale) Geomorphology and Quaternary deposit thickness
ABPmer UK Renewables Atlas	UK	2008	Mean spring tidal range, tidal currents
ABPmer – SEASTATES Wave Hindcast Model	UK	2018	Significant wave height and direction
British Geological Survey (BGS) Geology of Britain viewer and Offshore GeoIndex Viewer	UK	2014	Solid geology, quaternary thickness, seabed sediment
Cefas Suspended Sediment Climatologies around the UK	Regional	2016	Regional variations in suspended sediment concentrations (SSCs) CEFAS 2016. Monthly averages of non-algal SPM (doi:10.14466/CefasDataHub.31).
JNCC	UK	2024	List of the GCR sites, and associated reports
NatureScot	Scotland	2023	Site of Special Scientific Interest (SSSI) Scotland

6.1.3.2. Site-Specific Surveys

Site-specific surveys will be undertaken for the Offshore Project and, where available at the time of writing, will be used to inform the EIA. These surveys may include the following:

- Geophysical surveys
- Metocean surveys
- Environmental surveys, including drop down video and grab samples

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The exact specifications of the geophysical and metocean surveys will be determined subject to engineering design requirements and timelines for data acquisition.

6.1.3.3. Overview of the Baseline Environment

Supporting this Offshore Scoping Report, an initial desk-based review of literature and available data sources (see Table 6.1-1) has been undertaken; the findings are presented below, to provide an understanding of the baseline environment for Physical and Coastal Processes.

Bathymetry

Water depths off the northwest coast of Scotland are typically between 100 m to 150 m, (Baxter *et al.* 2011) deepening to the northwest. The Array Area is located just north of The Minch, a half graben bathymetric trough (Bradwell and Stoker, 2015). Within the Array Area, publicly available bathymetry data from EMODnet and MD indicate water depths between approximately 75 m and 116 m relative to LAT, as shown below in Figure 6.1-1. Water depths across the Array Area vary with the shallowest water depths towards the centre and the deepest waters at the western corner of the Array Area. Within the Offshore Cable Corridor Area of Search water depths generally varied gently with the shallower areas found in the centre and northwest (approx. 60-70 m LAT) linked to plateaus, glacial and potentially mobile sediment features and some near surface and outcropping geology. Depth decreased more significantly along the coast.

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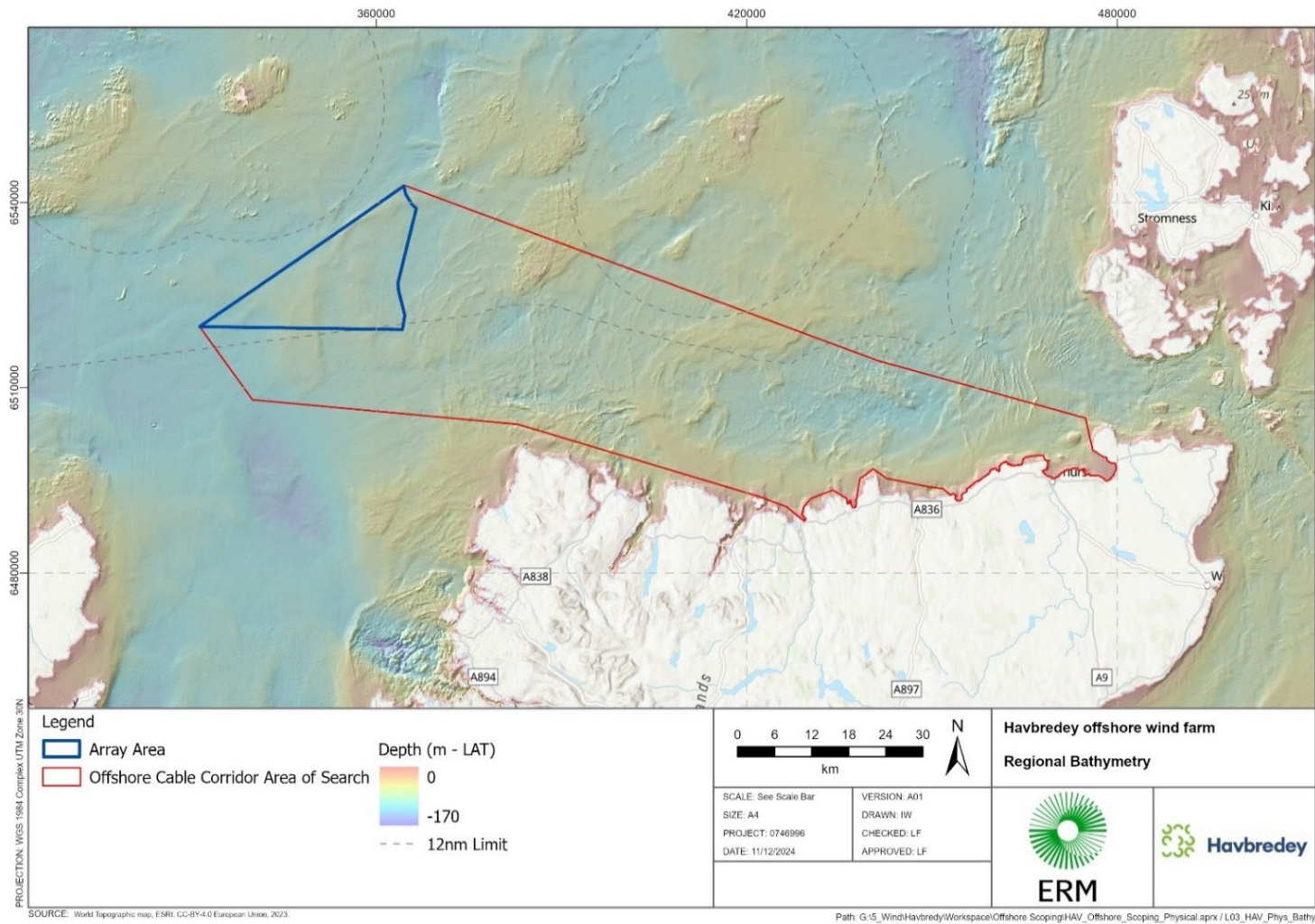



Figure 6.1-1 Overview of Regional Bathymetry (Source: EMODnet, 2022)

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Geology

The Array Area is located to the northeast of the Isle of Lewis, and east of the Outer Hebrides Fault Zone, lying within the North Lewis Basin (BGS, 2014, Fyfe *et al.* 2021). The primary geology of the Array Area and northwestern part of the Offshore Cable Corridor Area of Search comprises of Jurassic argillaceous sandstone and limestone lithologies, shown in Figure 6.1-2 below (Marine Scotland, 2024; EMODnet, 2021). The central section of the Offshore Cable Corridor Area of Search crosses Permian and Triassic conglomerates, sandstones, mudstone and evaporites offshore. The coast along the west of the Offshore Cable Corridor Area of Search, closer towards Bettyhill, is likely to cross the Lewisian Gneiss Complex and Moine Gneiss Supergroup. Whilst to the east, closer to Dunnet, Devonian mudstones and sandstones dominate (Marine Scotland, 2024; EMODnet, 2021). West of Bettyhill and the surrounding areas have large outcrops of Devonian lacustrine organic mudstones and siltstones of the Upper Caithness Flagstone Group. These rocks are characteristic of the Orcadian Basin, and notably fossiliferous, with some outcrops categorised as GCR sites, discussed further in Table 6.1-2.

The north of mainland Scotland and around the Isle of Lewis was impacted by the advance and retreat of the last British–Irish Ice Sheet (BIIS) during the main ‘Late Weichselian’ (Devensian) glaciation (c. 26-11.7 thousand years (ka) before present (BP)). Prior to this, there are indications that the BIIS was also present in the northwest sector between ~44-38 ka BP and ~32-30 ka BP (Bradwell *et al.* 2021). Numerous stages of deglaciation subsequently took place between ~28–25 ka BP, with a final retreat leading to the Offshore Cable Corridor Area of Search being ice free around 16 ka BP indicated by ice-retreat features and ice-marginal sediments (Ballantyne and Small, 2018).

Across both the Array Area and the Offshore Cable Corridor Area of Search, there are a number of glacial moraines delineated as shown in Figure 6.1-3. These glacial features are oriented roughly northeast-southwest and north-south and were likely produced during the Devensian glaciation (EMODnet, 2024). Roughly 12 km to the east of the Array Area there are large bedrock outcrops reaching up to 10 km by 18 km in extent. None are currently identified within the Array Area but are likely to cross a section of the Offshore Cable Corridor Area of Search.

The Late Quaternary sediments deposited by these glacial and pro-glacial systems, comprise either acoustically structureless glacial diamicton or strongly layered glaciomarine sediments (Bradwell and Stoker, 2015). The thickness of these quaternary sediments across the Offshore Cable Corridor Area of Search as shown in Figure 6.1-4 varies from 5-20 m in the east and reaches up to 50 m thick in the western corner of the Array Area (BGS, 2014).

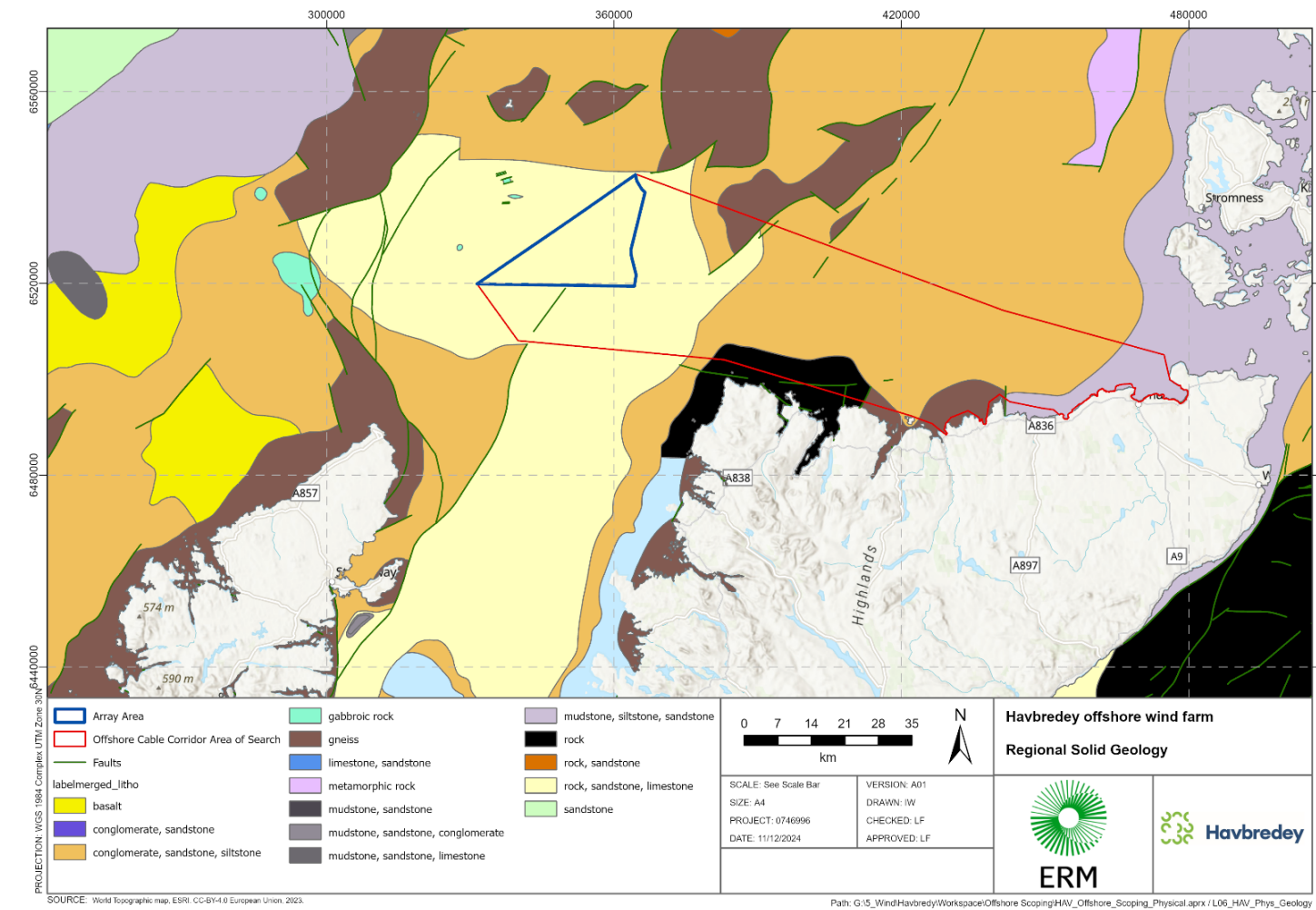


Figure 6.1-2 Overview of Solid Geology (Source: EMODnet, 2021)

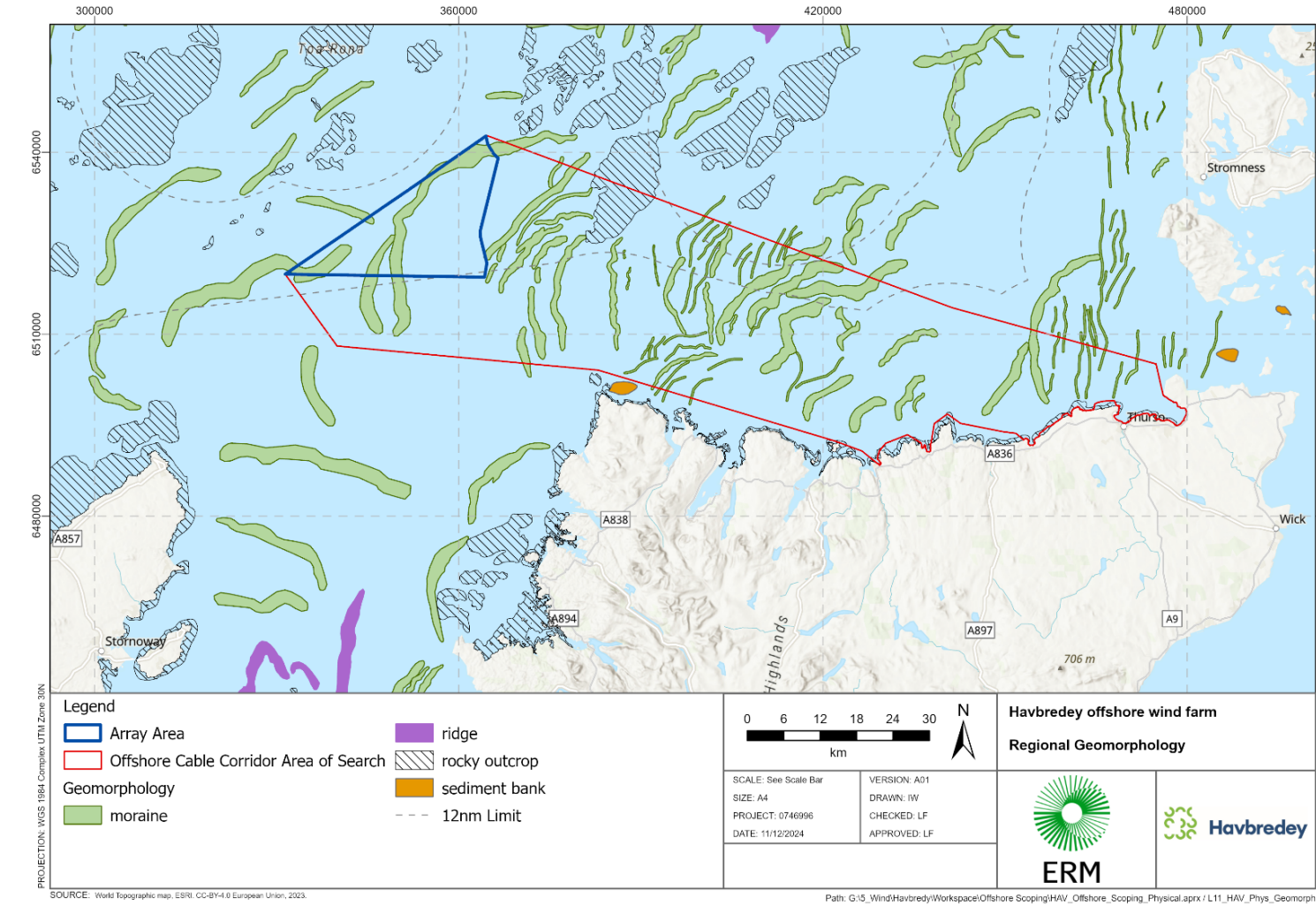


Figure 6.1-3 Overview of Regional Geomorphology Showing Glacial Features (Source: EMODnet, 2024)

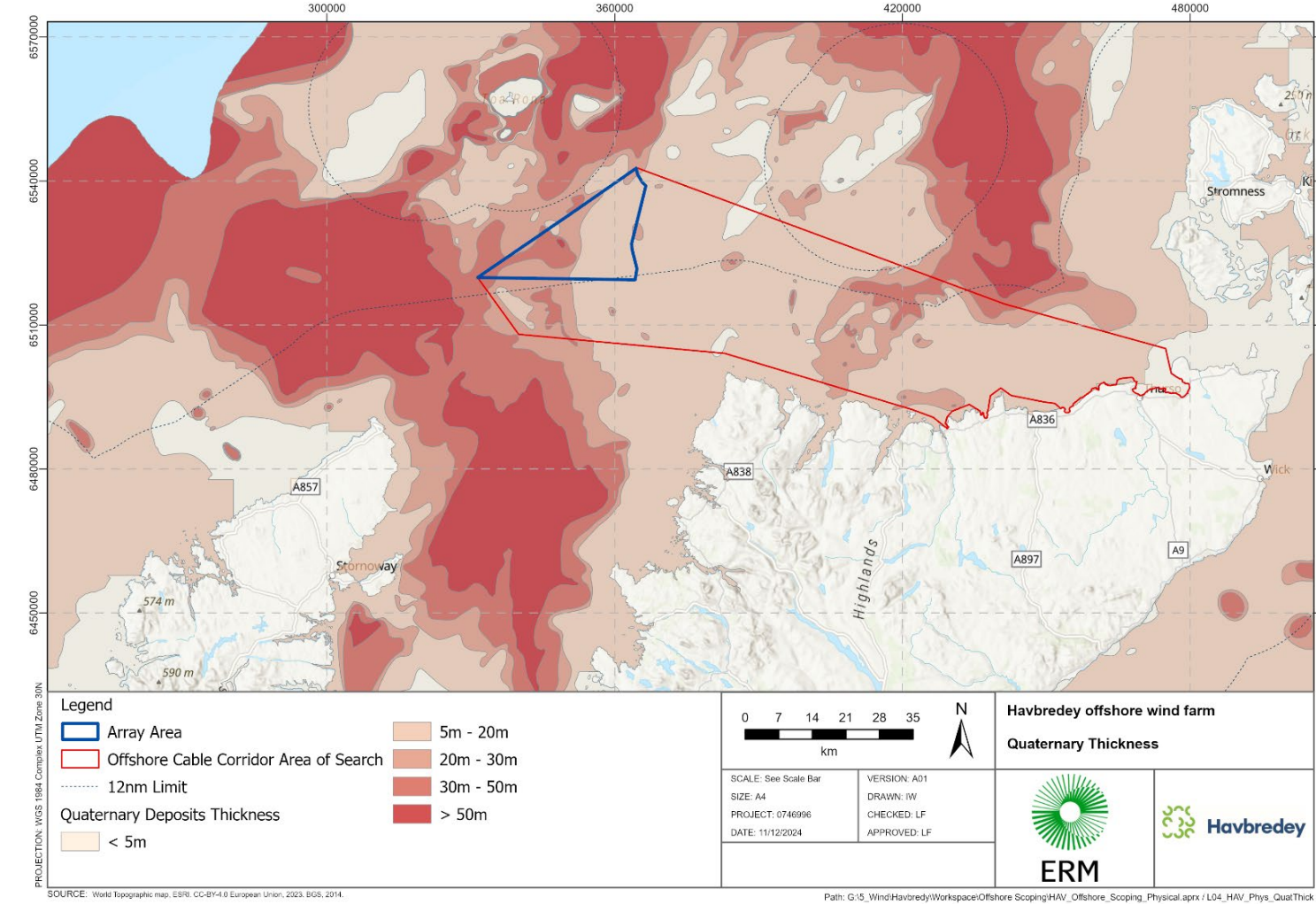




Figure 6.1-4 Overview of Quaternary Deposit Thickness (Source: EMODnet, 2024)

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Along the Landfall Area of Search there are a number of GCR sites and SSSIs that need to be considered, as illustrated in Figure 6.1-5 and briefly described in Table 6.1-2 below. Note, no MPAs or SACs designated for geological features are within the Physical and Coastal Processes Study Area. Sites protected for geological features will be reevaluated once the Wider Physical and Coastal Processes Study Area has been defined, following the process described in Section 6.1.2.

Table 6.1-2 GCR Sites and SSSIs within the Vicinity of the Landfall Area of Search

Name	Location	Site description and relevant geological features
Sgeir Ruadh, Portskerra GCR (ID: 2970)	Outside Landfall Area of Search, within Wider Physical and Coastal Processes Study Area	Moine migmatite rocks exposed for 1.5 km of coast around Portskerra (Mendum <i>et al.</i> 2009; Marine Scotland, 2024; JNCC, 2024); linked to Strathy Coast SSSI (ID: 1689).
Drunhollistan GCR (ID: 399)	Outside Landfall Area of Search, within Wider Physical and Coastal Processes Study Area	Succession of Pleistocene deposits and evidence for glacial succession and pattern of ice movements in the area (Gordon and Sutherland, 1993; Marine Scotland, 2024; JNCC, 2024); linked to the Red Point Coast SSSI (ID: 1338).
Red Point GCR (ID: 1813)	Outside Landfall Area of Search, within Wider Physical and Coastal Processes Study Area	Unique outcrop of Devonian lacustrine lithofacies, lying uncomfortably above granodiorite basement (Barclay <i>et al.</i> 2005; Marine Scotland, 2024; JNCC, 2024); linked to the Red Point Coast SSSI (ID: 1338).
Holborn Head Quarry GCR (ID: 647)	Outside Landfall Area of Search, within Wider Physical and Coastal Processes Study Area	Produced specimens of 10 or 11 species of Devonian fish fossils: notably abundant <i>Osteolepis panderi</i> fossils (Dinely and Metcalf, 1999; Marine Scotland, 2024; JNCC, 2024).
Pennyland GCR (ID: 648)	Within Landfall Area of Search and Physical and Coastal Processes Study Area	Produced 9 species of Devonian fish fossil, notably the placoderm <i>Millerosteus minor</i> (Dinely and Metcalf, 1999).
Pennyland to Castlehill (Thurso-Scrabster) GCR (ID: 1814)	Within Landfall Area of Search and Physical and Coastal Processes Study Area	Non-marine Devonian shallow lake and fluvial sediments. Basal marginal facies differ from Wick & Stromness (Barclay <i>et al.</i> 2005).

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Name	Location	Site description and relevant geological features
Dunnet Bay GCR (ID: 227)	Within Landfall Area of Search and Physical and Coastal Processes Study Area	Extensive beach dune system with numerous wide and deep dune blowouts at various stages of development and stability (May and Hansom, 2003; Marine Scotland, 2024; JNCC, 2024); linked to Dunnet Links (ID: 572).
Glaisgeo to Farr Point GCR (ID: 2989)	Within Landfall Area of Search and Physical and Coastal Processes Study Area	Moine and Lewisian rocks of Scotland (Mendum <i>et al.</i> 2009; Marine Scotland, 2024; JNCC, 2024).
Ard Mor, Bettyhill GCR (ID: 2971)	Within Landfall Area of Search and Physical and Coastal Processes Study Area	Amphibolites showing the effects of polyphase deformation and metamorphism (Scottish Geology Trust, 2024; Marine Scotland, 2024; JNCC, 2024).
Farr Bay, Bettyhill GCR (ID: 2988)	Within Landfall Area of Search and Physical and Coastal Processes Study Area	Lewisian, Torridonian and Moine rocks of Scotland (Mendum <i>et al.</i> 2009; Marine Scotland, 2024; JNCC, 2024).
Dunnet Head SSSI (ID: 571)	Within Landfall Area of Search and Physical and Coastal Processes Study Area	Located on the north coast of Caithness about 10 km east of Thurso. The site is designated for nationally important coastal vegetation (NatureScot, 2024).
Dunnet Links SSSI (ID: 572)	Within Landfall Area of Search and Physical and Coastal Processes Study Area	Located at Dunnet Bay, 8 km east of Thurso, Caithness. Designated for coastal geomorphology of Scotland and sand dunes (GCR ID: 227) (NatureScot, 2024).
Pennylands SSSI (ID: 1278)	Within Landfall Area of Search and Physical and Coastal Processes Study Area	Located on the foreshore between Thurso and Scrabster on the north coast of Caithness. Designated features include exposed layered sedimentary rock including non-marine Devonian and Silurian – Devonian Chordata (NatureScot, 2024).
Holborn Head SSSI (ID 789)	Within Landfall Area of Search and Physical and Coastal Processes Study Area	Located 2 km northwest of Thurso on the north coast of Caithness. Designated for its maritime cliffs and fossil fish (NatureScot, 2009)
Ushat Head SSSI (ID: 1585)	Within Landfall Area of Search and Physical and Coastal Processes Study Area	Located approximately 9 km northwest of Thurso, on the north coast of Caithness. Designated for maritime cliff and maritime heath (NatureScot, 2024).

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Name	Location	Site description and relevant geological features
Sandside Bay SSSI (ID: 1405)	Within Landfall Area of Search and Physical and Coastal Processes Study Area	Located north of Reay, on the north coast of Caithness. Two coastal sites designated for sand dunes (NatureScot, 2024).
Strathy Coast SSSI (ID: 1689)	Within Landfall Area of Search and Physical and Coastal Processes Study Area	Located 7 km east of Bettyhill, designated for north, east and west facing cliffs. Geological features include Moine (GCR ID: 2970). Biological features include coastlands (machair, maritime cliff, sand dune and saltmarsh) and vascular plant assemblage (NatureScot, 2024).
Red Point Coast SSSI (ID: 1338)	Within Landfall Area of Search and Physical and Coastal Processes Study Area	Located in Caithness and Melvich Bay. The site contains two geological features including ancient lake margin sediments from the Middle Devonian and Quaternary sediments deposited by Ice Age glaciers (GCR IID: 399 and 1813). Features include maritime cliffs, Scottish primrose <i>Primula scotica</i> and guillemot <i>Uria aalge</i> (NatureScot, 2024).
Invernaver SSSI (ID: 815)	Outside Landfall Area of Search, within Wider Physical and Coastal Processes Study Area	Located 0.5 km west of Bettyhill. Designated for coastal geomorphology of Scotland. Biological features include coastland sand dune, saltmarsh, upland assemblage and vascular plant assemblage (NatureScot, 2024).

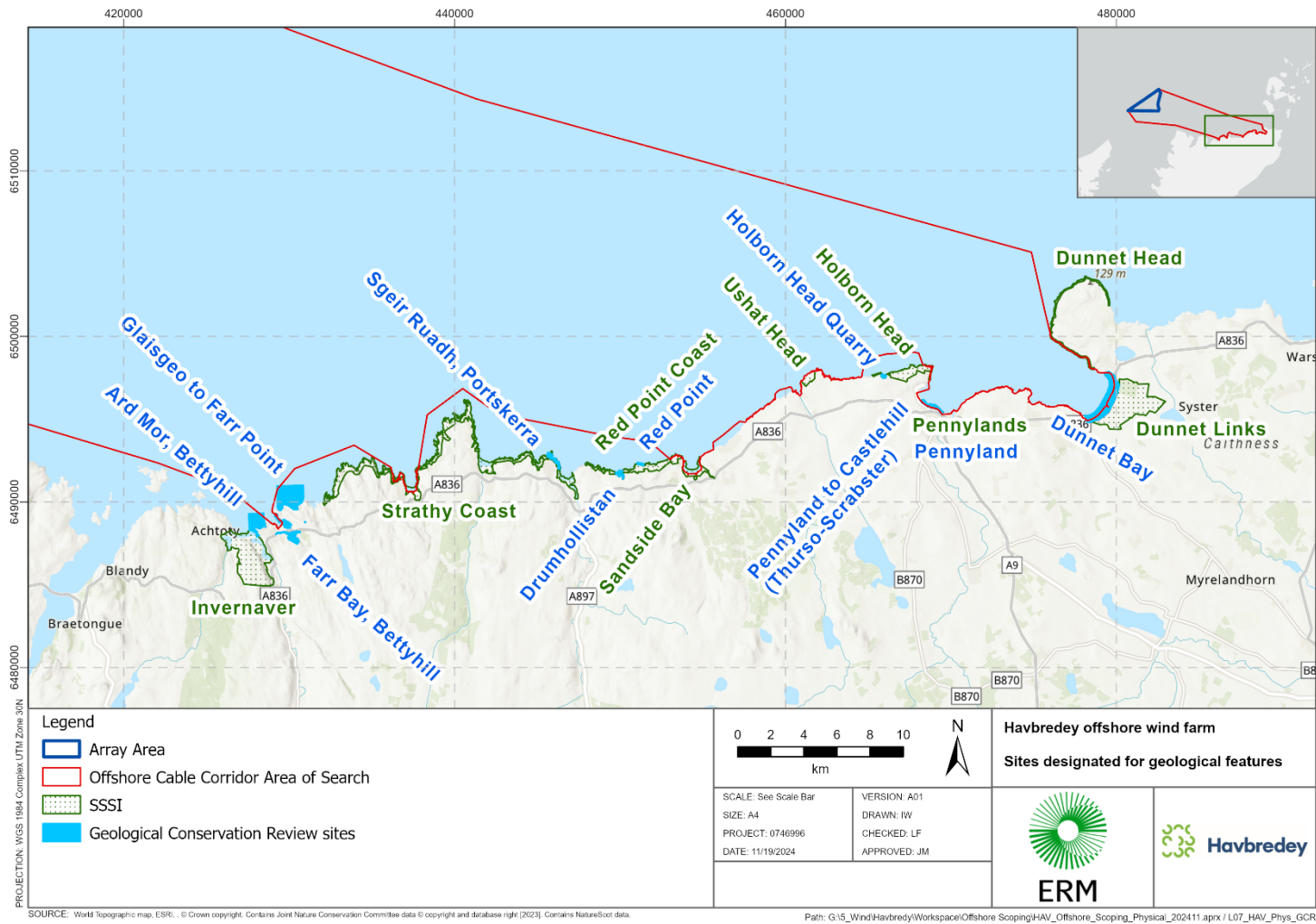



Figure 6.1-5 Overview of Protected Areas including GCR Sites (Source: Marine Scotland, 2024; EMODnet, 2024)

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Seabed Sediments

Seabed sediments around the Western Isles and the north coast of mainland Scotland are derived mainly from reworking of glacial and glaciomarine Quaternary sediments (Bradwell *et al.* 2019; BGS and Threadgold, 1997). Between Bettyhill and Dunnet, the nearshore environment is predominantly rocky in nature with large extensive bedrock outcrops, indicating a high-energy environment, with some areas of coarse sand, gravel and shingle in pockets between rock outcrops and boulders as shown in Figure 6.1-3. Seabed sediments at Bettyhill are predominantly gravelly sands, and sediments towards Dunnet are gravelly sands and sand, as shown in Figure 6.1-6. Seabed sediments in the Array Area are coarse Holocene gravelly sands, sandy gravels and sand (Marine Scotland, 2024).

The north coast of mainland Scotland has experienced two levels of glacial erosion, increasing in intensity from east to west, with the distribution of eroded and abraded bedrock outcrops providing indication of glacial flow and degree of erosion. Towards Dunnet, glacial erosion is marked with subordinate modifications and concavities also convexities showing some ice moulding (Gordon and Suntherland,1993). Further east towards Bettyhill, bedrock has been subjected to extensive excavation along the main glacial flow lines and forming ice-scoured bluffs (Gordon and Suntherland,1993). These reworked sediments associated with the Late Devensian glaciation are deposited offshore the north coast. Across the Array Area and towards the coast within the Offshore Cable Corridor Area of Search the finer mud and silt components of glacial deposits have been transported away from regions of high hydraulic energy leaving the coarser sediments behind (Stoker, Hitchen and Graham,1993). Asymmetric sandwaves and associated sandbanks are present near Cape Wrath and the crests are oriented parallel to the coastline (Stoker, Hitchen and Graham,1993).

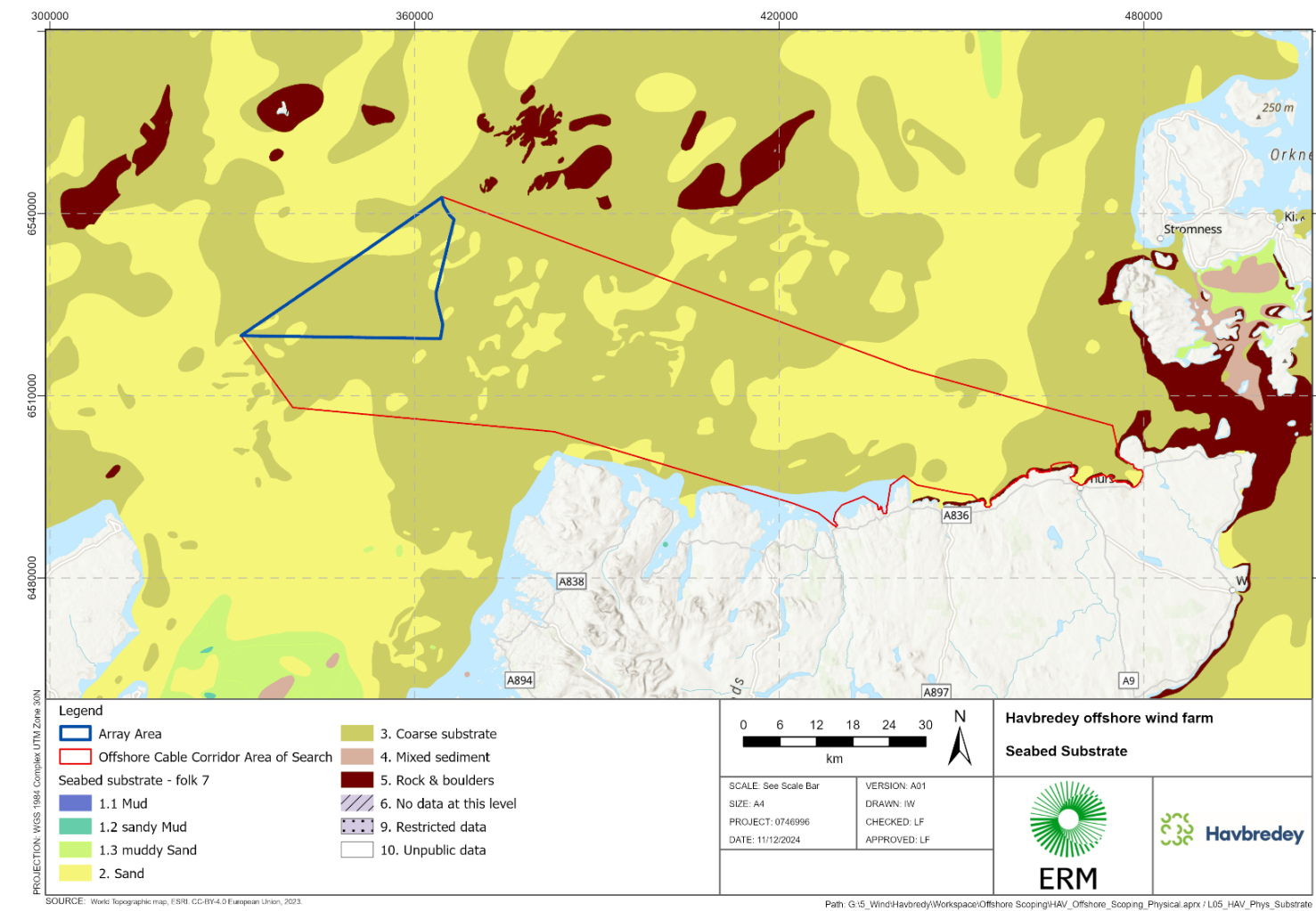



Figure 6.1-6 Overview of Seabed Sediments (Source: EMODnet, 2019)

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Sediment Transport Pathways

Physical and Coastal Processes are dominated by wave and wind action (Ramsay and Brampton, 2000) with only storm wave action leading to offshore sediment transport. Net sediment transport is generally downslope, northwards, and driven by residual currents (Ramsay and Brampton, 2000). Due to the very coarse nature of the seabed sediments in the Array Area and Offshore Cable Corridor Area of Search storm wave conditions are required for much of the sediment to undergo active transport (Bradwell *et al.* 2019; BGS and Threadgold, 1997). Inshore sheltered bays within the Landfall Area of Search capture any fine sands, with the movement and stability of each bay specific to each location.

The Array Area and Offshore Cable Corridor Area of Search are situated between the Hebrides Shelf and the West Shetland Shelf where bottom currents transport sediments northeast to southwest (Stoker, Hitchen and Graham, 1993). The general pattern of linear bedforms including sand streaks and sand ribbons in the vicinity of Cape Wrath have long axes aligned along shelf or parallel to the coastline, and evidences a primary sediment transport direction parallel to the coastline (Stoker, Hitchen and Graham, 1993). However, local sediment transport pathways can be more complex.


Since the change in sea level during early post-glacial transgression of the shelves, the region has low sediment availability and hence the volume of sediment transported is low (Gordon and Suntherland, 1993).

In the Array Area there are limited means for resuspending and transporting any available sediment due to the weak tidal currents and deep water depths (for wave action), limiting resuspension and transportation of sediment to storm events (discussed in the following sections). This is confirmed by the low levels of suspended sediment identified within the region (Scottish Continental shelf) throughout the seasons (<2 Milligrams per Litre (mg/l)) (Cefas, 2016).

Along the coast the coastal migration patterns have been monitored by aerial photography and field data, tracking migration landward by erosion or submergence, or migration seaward by accretion or emergence (EMODnet, 2024). Between Bettyhill and Dunnet the coastline overall is classified as being stable, showing ≤0.5 m net change in position over a 10-year period (EMODnet, 2024).

Tides (range and velocities)

As with the bulk of the northwest European shelf the tides in the offshore environment are dominated by the two semidiurnal constituents: the M2 and the S2 constituents. The spring tidal range in the Array Area is approximately 3.0 m increasing slightly (by 0.1 m) to the southern end of the Array Area. There is little west to east variation in the tidal range along the Scottish north coast in the vicinity of the Offshore Cable Corridor Area of Search and Landfall Area of Search, for example spring tides are 4 m at Cape Wrath, 3.8 m at Bettyhill and 3.75 m at Dunnet Bay (ABP, 2008). There are small variations in the tidal range depending on the exact shape of the particular embayment.

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As shown in Figure 6.1-7 below, spring tidal velocities in the Array Area are around 0.4 m/s, increasing towards the coast but with a high degree of local variation due to the bathymetry. Flows at headlands on the coast may increase to 1 m/s but flows in embayments may be less, generally <0.4 m/s.

The consequence of the lower flows in the Array Area are that the tidal excursions are smaller, approximately 4.5 km with a relatively open tidal ellipse, and that non tidal flows become more important as a consequence. In the region near the coast, the tidal flows are constrained by the coast and are more rectilinear (west – east) but this will be modified around headlands and bays; for instance tidal currents in Dunnet Bay itself are very low (<0.25 m/s) but tides in the Pentland Firth (just to the north of Dunnet Bay around the headland) are high > 1.5 m/s. The consequence of this spatially varied tidal regime coupled to changing depth is that the near shore is vertically well mixed, whereas the offshore environment is seasonally stratified (a density difference). The consequence of this is discussed below.

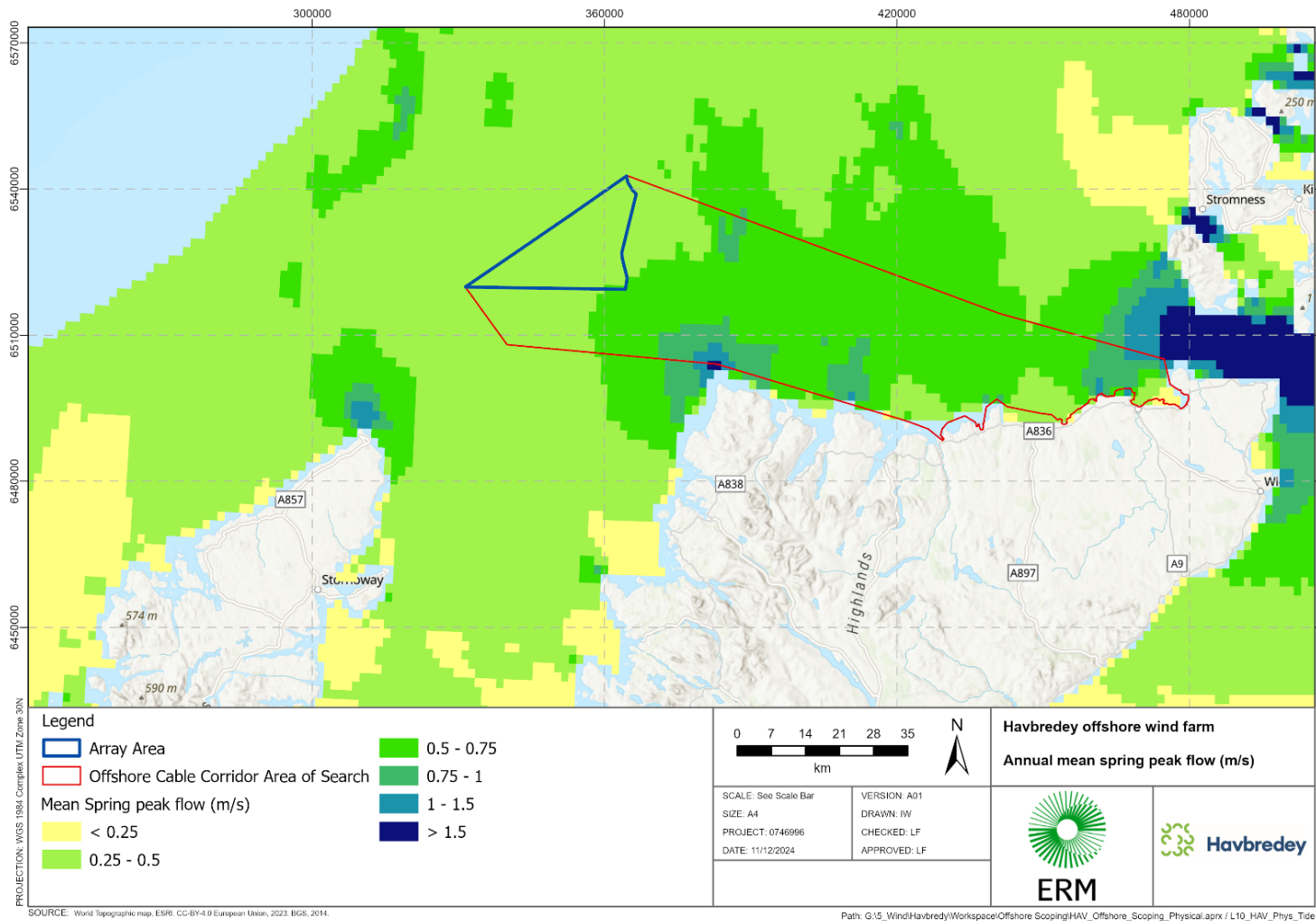



Figure 6.1-7 Mean Spring Peak Tidal Flow from ABPmer Models

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Non-tidal Flows

The direction of the non-tidal flows (residual currents) through the Array Area is eastwards due to the presence of the Scottish Coastal Current (SCC) (Inall and Sherwin, 2006). Modelling has shown the residual flow in the Array Area is relatively strong (Figure 6.1-8), with a mean speed of 0.05 m/s on average, compared with the rest of the UK where shelf currents average 0.01 m/s. Thus, the advection over 24 hours is 4.3 km and is similar to the tidal excursion.

Storms are another major driver of current flows in the region. In the UK the dominant driver of storminess is the North Atlantic storm track. This in turn is driven on a decadal timescale by the North Atlantic Oscillation (NAO). When the NAO is positive the west coast of Britain is prone to high waves and stormy weather, especially in winter (Wolf *et al.* 2020).

The area is exposed to a significant number of storms with significant swell in addition to locally produced waves (Neill *et al.* 2017). With these combined influences, extreme storm surges (50 year return period) within the Array Area may increase water elevation by up to 1 m and may have a peak current speed of 0.6 m/s (Inall and Sherwin, 2006).

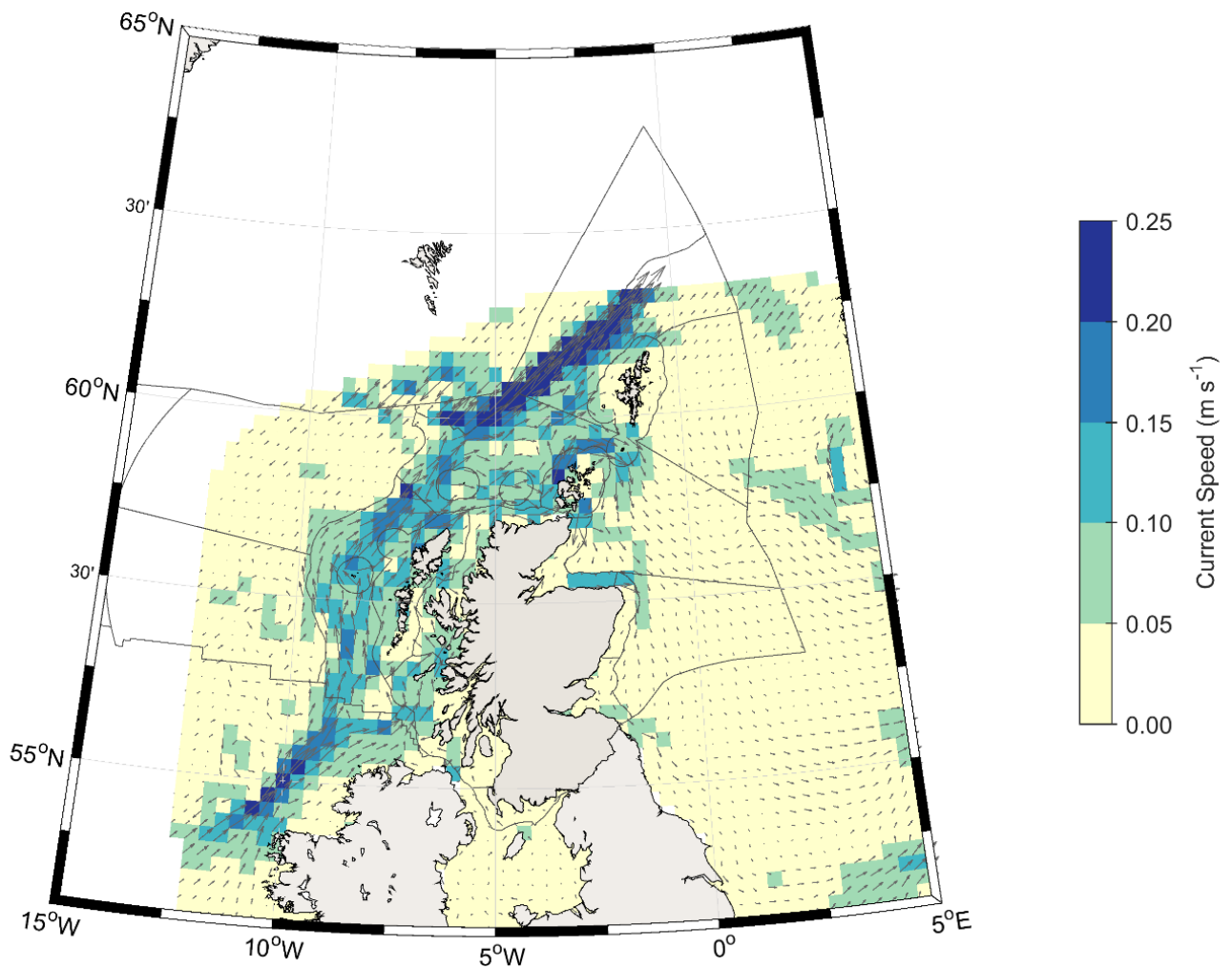



Figure 6.1-8 Mean Residual Current Speed, from the Scottish Shelf Model (Dominicis et al. 20018) (From Marine Scotland 2020a)

Waves

Figure 6.1-9 shows the annual mean Significant Wave Height (Hs) within the Array Area. The figure shows the Array Area is exposed to a range of waves, predominately from the west. Waves in excess of 6 m occur approximately 5% of the year, whilst the most commonly occurring condition is the 2.25–3 m Hs (approximately 12% of the year). Waves are only less than 1.5 m Hs for approximately 10% of the year. This model data is relatively coarse and likely to be a significant underestimate of both the maximum and calm periods conditions.

Analysis prepared for a planned but never constructed wave energy test site on the west coast of the Isle of Lewis gives estimates of Hs waves in excess of 17.3 m with a 100 year return period, 15.1 m with a 10 year return period, and 12.8 m with a 1 year return period (Lewis Wave Power Ltd, 2012). The Isle of Lewis site is likely to experience similar extreme conditions as the Array Area as both are exposed to strong winds and large fetch which generates large waves.

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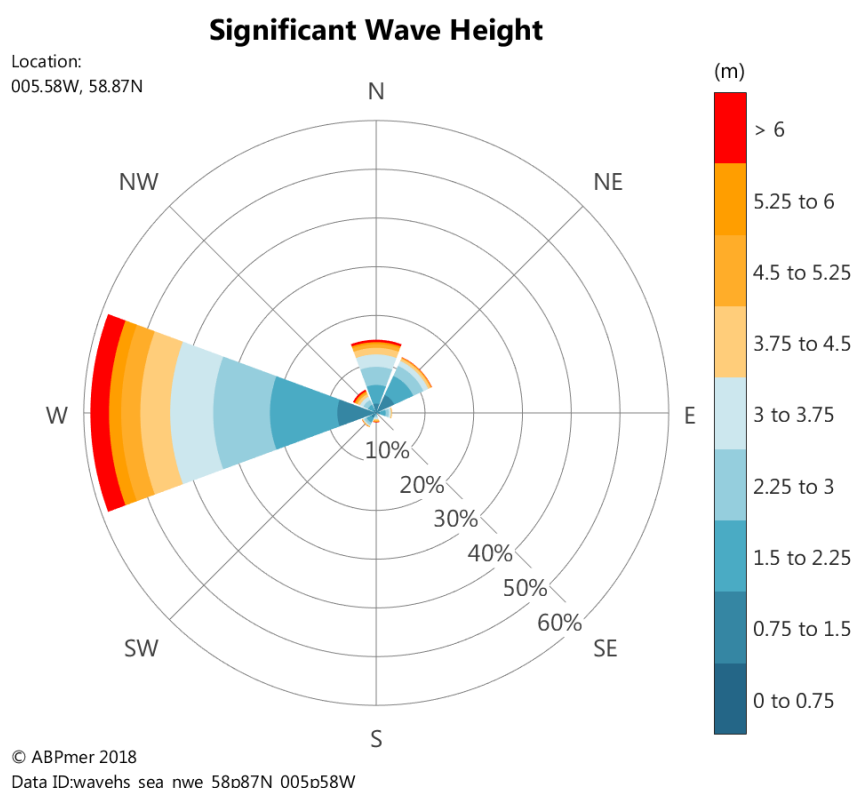



Figure 6.1-9 Annual Mean Significant Wave Height Within the Array Area from Course Resolution Modelling (ABPmer, 2008)

Stratification, Frontal Zones and Residual Currents

Stratification in the ocean or shelf seas is when a sharp density gradient occurs (a Pycnocline). It can be due to salinity or temperature or both. Salinity usually drives the stratification in lochs or coastal systems however, in the offshore environment stratification is most often seasonal stratification where the energy input from solar irradiance overcomes mixing due to the tides. In shallower regions where the tides are strong the seas are well mixed both for temperature and for salinity. Frontal zones mark boundaries between water masses, including tidally mixed and stratified areas, and occur throughout Scottish seas. These fronts play an important role in bringing nutrients from beneath the surface, towards the surface where light availability will result in enhanced primary productivity. This enhanced primary productivity leads to enhanced biological activity through the food web in the form of enhanced local abundance of pelagic fish, seabirds and mammals (NatureScot, 2020).

Away from frontal regions the areas that stratify can also have enhanced primary productivity along the base of the Thermocline (Fernand *et al.* 2001) depending on the depth of the mixed layer and the availability of nutrients. Figure 6.1-10 shows there is potential overlap with the Offshore Cable Corridor Area of Search, which straddles the mixed and stratified, while the Array Area is in a region which weakly stratifies, as discussed above.

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Further papers that will contribute to defining the baseline environment within the Offshore EIAR include:

- Durrel, *et al.* 2022. Anthropogenic Mixing in Seasonally Stratified Shelf Seas by Offshore Wind Farm Infrastructure
- Christiansen *et al.* 2023. The large-scale impact of anthropogenic mixing by offshore wind turbine foundations in the shallow North Sea
- Floeter, *et al.* 2017. Pelagic effects of offshore wind farm foundations in the stratified North Sea
- Carpenter, *et al.* 2016. Potential Impacts of Offshore Wind Farms on North Sea Stratification
- Schultze, *et al.* 2020. Increased Mixing and Turbulence in the Wake of Offshore Wind Farm Foundations
- Christiansen *et al.* 2022. Emergence of Large-Scale Hydrodynamic Structures Due to Atmospheric Offshore Wind Farm Wakes
- Brostrom, 2008. On the influence of large wind farms on the upper ocean circulation
- Ludewig, 2015. On the Effect of Offshore Wind Farms on the Atmosphere and Ocean Dynamics

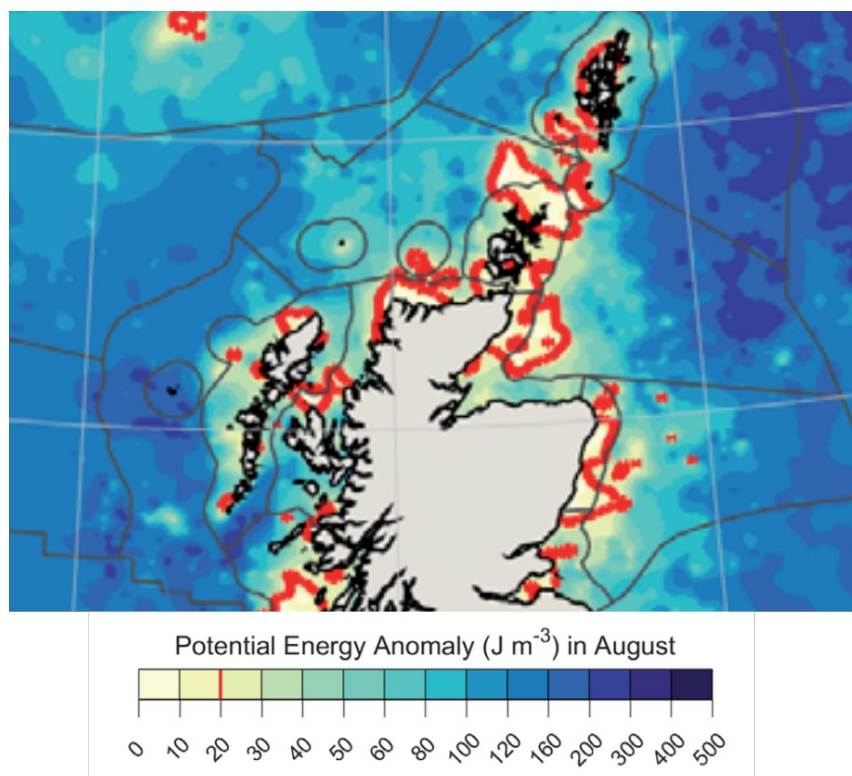


Figure 6.1-10 Shows the Extent of Stratification, the Red Line Marks Frontal Regions. (adapted from Marine Scotland 2020)

6.1.4. DESIGNED IN MITIGATION

The designed in mitigation measures relevant to the Physical and Coastal Processes assessment, which have been incorporated into the current design of the Offshore Project, are outlined below in Table 6.1-3.


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Table 6.1-3 Physical and Coastal Processes Designed In Mitigation Measures


ID	Designed In Measure	How the measure will be secured
ID001	The outputs of the site-specific geophysical and environmental surveys will be reviewed as part of a Layout Plan to ensure that the final design and location of key Offshore Project infrastructure takes full account of the physical and benthic environments. Any sensitive areas identified will be avoided, as far as is possible, by micrositing WTGs and cables.	Secured under Section 36 and/or Marine Licence consent conditions.
ID002	A Cable Installation Plan will be produced prior to construction to confirm routing, method of installation and aspects such as target Depth of Burial and need for/location of/type of external cable protection. This Plan will also contain the outputs of a formal Cable Burial Risk Assessment (CBRA). Data from the site-specific geophysical surveys will be used to identify the final preferred route. Cables will be buried in soft sediment, where possible, with the use of external cable protection as required in areas where burial is not possible.	Secured under Section 36 and/or Marine Licence consent conditions.
ID003	A CEMP and PEMP will be developed prior to construction and adhered to in compliance with legislative requirements and best practice standards and guidance.	Secured under Section 36 and/or Marine Licence consent conditions.

6.1.5. SUMMARY OF KEY RECEPTORS, SENSITIVITIES AND LIKELY SIGNIFICANT EFFECTS

The key receptors for Physical and Coastal Processes are:

- The seabed and coastline within the Physical and Coastal Processes Study Area
- Offshore morphological features, such as moraines
- Designated sites of geological interest

Physical and Coastal Processes are also considered pathways to effects on other receptor groups, which may lead to a potential impact on fish and shellfish, benthic and intertidal ecology, marine mammals and other megafauna, marine sediment and water quality, commercial fisheries, infrastructure and other sea users and marine protected sites. In these cases, the Physical and Coastal Processes Offshore EIAR Chapter

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will describe the source of such effects, and the pathways that may lead to an effect on that type of receptor.

The pathways to effect on Physical and Coastal Processes receptors, mentioned above, and other topic receptor groups may include:

- Changes in seabed sediments
- Changes to tidal currents
- Changes to waves regime (including during storms)
- Changes to sediment transport and suspended sediment
- Changes to stratification, which can affect nutrient transfer and phytoplankton growth

6.1.5.1. Likely Significant Effects

The scoping of likely significant effects on Physical and Coastal Processes receptors which may arise within the Physical and Coastal Processes Study Area via the proposed Offshore Project, is outlined in Table 6.1-4.




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Table 6.1-4 EIA Scoping Assessment for Physical and Coastal Processes


Potential Impact	Scoping Result	Justification	Assessment Method
Construction and Decommissioning			
Potential changes in morphology at the coast (receptor)	In	Construction methods, including trenching and associated activities, may cause changes in coastal morphology, including to sites designated for geological features (see Table 6.1-2).	Semi-quantitative tools, coupled with evidence from analogous projects including other OWFs and subsea cables, and qualitative assessments using available literature.
Potential changes in morphology of offshore morphological features (including moraines) (receptor)	In	The effects from installation of Offshore Project infrastructure will be assessed to identify any changes that may create a pathway to impact morphological features.	Use of standard empirical equations describing (for example) the potential for scour development around vertical structures where present, and cables (e.g. Whitehouse, 1998), where applicable.
Potential changes to sediment type, via sediment transport and suspended sediment (pathways)	In	Installation of Offshore Project infrastructure will be assessed to identify any changes that may create a pathway to impact the sediment type, including the sediment transport or SSC.	Semi-quantitative assessment(s) for sediment transport blockage(s) with reference to sediment transport pathways from a high-resolution regional-scale model.
Operation and Maintenance			
Potential changes in morphology at the coast (receptor)	In	Placement of export cable related structures on the seabed (e.g. scour protection) may cause changes in coastal morphology,	Use of spreadsheet-based tools for extent and concentration of any sediment plumes produced via

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Potential Impact	Scoping Result	Justification	Assessment Method
		including to sites designated for geological features (see Table 6.1-2).	Offshore Project installation activities and associated changes in bed level.
Potential changes in morphology of offshore morphological features (including moraines) (receptor)	In	Potential effects generated by the presence of Offshore Project infrastructure during operations and maintenance activities (e.g. anchors, scour protection, and mooring lines) will be assessed to identify any changes that may create a pathway to impact morphological features.	Use of standard empirical equations describing (for example) the potential for scour development around vertical structures where present, and cables (e.g. Whitehouse, 1998), where applicable.
Potential changes to tidal currents (pathway)	Out	While floating and above seabed structures may affect the tidal regime, the structures themselves represent a small fraction of the water column and therefore do not represent a barrier to or cause a drag on the propagation of the tidal wave. Thus, the structures will not change the tidal range, locally or at the nearest receptors (the coastline), or mean tidal velocities either locally or further afield. There is the possibility that the structures will enhance mixing locally which is covered under 'Potential changes to stratification' and that seabed structures may enhance scour and change sediment transport which is covered under 'Potential changes in morphology of offshore morphological features'.	
Potential changes to wave regime (pathway)	Out	While floating and above seabed structures may affect the wave regime, there are no receptors in the vicinity of the Array Area. WTGs will be at least 900 m apart so that while waves may reflect	

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Potential Impact	Scoping Result	Justification	Assessment Method
		from the structures and cause local changes, cumulative effects are not anticipated. The extant wave field experiences a wide range of wave heights, such that any local changes over a year will be imperceptible compared to natural variation.	
Potential changes to stratification (pathway)	In	Floating and above seabed structures may affect local water properties and stratification depth.	Qualitative assessment on potential effect on stratification and timing. Using published literature combined with available data to inform assessment.

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6.1.6. PROPOSED APPROACH TO EIA


6.1.6.1. Relevant Data Sources

Data sources listed within Table 6.1-1 and Table 6.1-5, alongside further secondary data sources including published and unpublished papers (including those listed in Section 6.1.3.3), journals and reports will be used to inform the EIA. These sources may be further supplemented by any additional material identified during stakeholder consultation. The Offshore Project also notes the ongoing work of the Physical Processes ScotMER Receptor Group (ScotMER, 2023), identifying evidence gaps related to hydrology and geomorphology; reference will be drawn from this where appropriate to do so.

In addition to the data sources highlighted in Table 6.1-1 and Table 6.1-5, the CES and the UK Research and Innovation ECOWind programme Physics-to-Ecosystem Level Assessment of Impacts of Offshore Windfarms (PELAGIO) (ECOWind, 2024) is researching ecosystem connectivity of wind farms, with specific modules considering the effects of FLOWs on mixing and stratification. Enabling Sustainable Wind Energy Expansion in Seasonally Stratified Seas (eSWEETS3) will observe the effects of FLOWs on water column mixing effects and is expected to run from May 2024 to February 2027. Outputs from this research will be incorporated into the Offshore EIAR if available at the time of writing.

Table 6.1-5 Summary of Key Publicly Available Datasets for Physical and Coastal Processes EIA Chapter

Source	Spatial Coverage	Year	Summary
Climate Econometrics	UK	2016	Rise in MSL.
Dynamic Coast (Coastal Cell 4) Duncansby Head to Capewrath	Scotland	2017	Coastal erosion and sea level rise monitoring and predictions.
General Bathymetric Chart of the Oceans (GEBCO)	UK	2022	Bathymetry 100 m resolution.
IHE Delft - Institute for Water Education, Coastal Futures (CoFu).	UK	2018	Rise in extreme sea level.
National Tidal and Sea Level Facility	UK	2023	Tides and sea level across the UK, closest locations Kinlochbervie and Stornoway.

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Source	Spatial Coverage	Year	Summary
SEA Data Portal and Reports	UK	Variable	Topic specific reports on SEA 7 and portal for data access.
United Kingdom Hydrographic Office (UKHO)	UK	2010	Bathymetry 3 metre resolution.

6.1.6.2. Consultation

Consultation and engagement will be key to confirm the methodology and approach to the assessment. Throughout the duration of the Offshore Project, collaboration between the Offshore Project team and external stakeholders will be established. Organisations that will be consulted with respect to this specific EIA topic, include:


- MD-LOT
- SEPA
- Joint Nature Conservation Committee (JNCC)
- NatureScot
- The Highland Council

6.1.6.3. Policy, Legislation and Guidance

The assessment of Physical and Coastal Processes will consider the legislation, policy and guidance listed below (Table 6.1-6).

Table 6.1-6 Legislation, Policy and Guidance Relevant to the Physical and Coastal Processes Assessment

Relevant Legislation, Policy and Guidance
Legislation and Policy
National Planning Framework 4 (NPF4) Scottish Government 2023
Blue Economy Vision
Scotland's National Marine Plan, 2015
Marine and Coastal Access Act, 2009
Environmental Assessment (Scotland) Act, 2009
Habitats Regulations (Annex I features)
Marine Strategy Framework Directive and Good Environmental Status
Guidance
Coastal and marine environmental site guide. 2nd edition (CIRIA, 2015)
Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects (Cefas, 2012)

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Relevant Legislation, Policy and Guidance
Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to Inform EIA of Major Development Project (Brooks <i>et al.</i> 2018)
Potential effects of offshore wind developments on coastal processes (ABPmer and METOC, 2002)
Offshore Windfarms: Guidance note for Environmental Impact Assessment in Respect of FEPA and CPA requirements (Cefas, 2004)
Coastal Process Modelling for Offshore Wind farm Environmental Impact Assessment: Best Practice Guide (ABPmer and HR Wallingford 2009)


6.1.6.4. Assessment Methodology

The assessment will follow the methodology described in Chapter 4: Proposed Approach to EIA. Further refinement of the methodology will be undertaken prior to the chapter being written as part of the baseline and stakeholder engagement. Cumulative and transboundary effects are also discussed in Chapter 4: Proposed Approach to EIA, and assessment of these will apply to Physical and Coastal Processes.

A conceptual understanding of the Physical and Coastal Processes baseline will be informed by a range of Offshore Project and non-Offshore Project specific measured and modelled (hindcast) data. Data sources will be supported by appropriate site-specific methodologies, listed below, and compared with evidence from analogous projects including other OWFs and subsea cables, and qualitative assessments using available literature. These include:

- Site-specific geophysical, environmental and metocean surveys, where available for the Offshore EIAR (see Section 6.1.3.2)
- Semi-quantitative assessment(s) for sediment transport blockage(s) and influence on scour from the Offshore Project, with reference to sediment transport pathways from a high-resolution regional-scale model
- Use of spreadsheet-based tools for extent and concentration of any sediment plumes produced via Offshore Project installation activities and associated changes in bed level
- Use of standard empirical equations describing (for example) the potential for scour development around vertical structures where present, and cables (e.g. Whitehouse, 1998), where applicable
- Analytical assessments of Offshore Project-specific data (such as metocean modelling report)

Magnitude and duration of impact will be considered under the Physical and Coastal Processes assessment, alongside the reversibility of the impact and the timing and frequency of the activity. An assessment of the likely significant effects of the Offshore Project will be undertaken through application of the known likely effects of the development coupled to potential impacts on receptors and pathways.

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Stakeholder consultation will be undertaken at pivotal points throughout the EIA process to ensure that the approach, including the application of the evidence base, satisfies the requirements of both stakeholders and regulators, such as after scoping, prior to commencement, and at the draft production of the chapter during the Offshore EIAR.

6.1.7. SCOPING QUESTIONS FOR CONSULTEES

Scoping questions for consultees in relation to the Physical and Coastal Processes Assessment include:

1. What are the expectations for how the understanding from ongoing work in relation to ScotMER projects, CES and UK Research and Innovation funded projects is to be addressed with in the Offshore EIAR? Noting that research project timelines may not align with the Offshore Project development timeline.
2. Do you agree that the data sources identified and surveys proposed are sufficient to inform the Physical and Coastal Processes baseline for the EIA?
3. Are there any additional documents that may be provided to assist in the assessment of impacts on receptors, such as baseline reports on GCRs?
4. Have all receptors and likely significant effects that could result from the Offshore Project been identified for this topic?
5. Do you agree with the assessment methodology proposed to be undertaken within the Offshore EIAR?
6. Do you agree that the designed in mitigation measures described provide a suitable means for managing and mitigating the relevant potential effects of the Offshore Project on key receptors?
7. Are there any other issues related to Physical and Coastal Processes that should be identified for this Project?


6.1.8. REFERENCES

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6.2. UNDERWATER NOISE

6.2.1. INTRODUCTION

This chapter of the Offshore Scoping Report provides an overview of the baseline environment for Underwater Noise within the Array Area and Offshore Cable Corridor Area of Search. It also includes a scoping assessment of likely significant effects for the relevant receptors, from the construction, operation (including maintenance), and decommissioning phases of the Offshore Project.

6.2.2. STUDY AREA

The Underwater Noise Study Area has been defined on the basis of anywhere around the Offshore Project that could be adversely affected by Underwater Noise related to the Offshore Project. A study area for Underwater Noise specifically is not technically defined in and of itself. It varies depending on the specific identified receptors that will be affected (e.g., marine mammals, fish). The Underwater Noise Study Area encompasses the footprint of the Offshore Project as defined in the Project Description Chapter (see Chapter 2: Site Selection and Project Description). The extent of the Underwater Noise Study Area beyond the Offshore Project depends on the specific identified receptors that will be affected by the construction, operation and maintenance, and decommissioning of the Offshore Project. The Underwater Noise Study Area for each receptor is calculated by the propagation of underwater noise as relevant to the sensitivity to underwater noise of the species or receptor (the “Underwater Noise Study Area”).

The scoping design envelope extends to MHWS meaning impacts from offshore infrastructure are considered for receptors below MHWS. It should be noted that the topic-specific study area will vary depending on the nature and scale of each receptor, or associated pathway, that could result in a receptor effect.

The Underwater Noise Study Area is defined by the receptors that may be impacted by underwater noise originating from within the Array Area and Offshore Cable Corridor Area of Search, as shown in Figure 1-1.


6.2.3. BASELINE ENVIRONMENT

6.2.3.1. Data Sources

Assessments for the adverse impact of Underwater Noise on key species of marine mammal and fish are based on fixed, absolute thresholds for noise caused by activities relevant to the Offshore Project, which are not dependent on the background noise levels, and do not require a baseline. As such, detailed, local baseline Underwater Noise studies are not typically undertaken for OWFs. General information on baseline Underwater Noise is given in this section.

6.2.3.2. Overview of the Baseline Environment

Background or “ambient” Underwater Noise varies spatially and is generated by a number of natural sources, such as rain, breaking waves, wind at the surface, seismic noise, biological noise and thermal noise.

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Biological sources include marine mammals (which use sound to communicate, build up an image of their environment and detect prey and predators) as well as certain fish and shrimp. Anthropogenic sources also add to the background noise, such as fishing and passenger boats, cargo ships, industrial noise, seismic surveys, and leisure activities.

The vast majority of research on marine species relating to both physiological effects and behavioural disturbance due to noise is based on determining the absolute noise level that causes the onset of that effect. As a result, criteria for assessing the effects of noise on marine mammals and fish tend to be based on the absolute noise criteria, as opposed to the difference between the baseline noise level and the specific noise being assessed. It is important to understand that baseline noise levels will vary significantly depending on, amongst other factors, seasonal variations and different sea states, meaning that the usefulness of establishing such a value would be limited.

6.2.4. DESIGNED IN MITIGATION

Certain measures have been adopted as part of the Offshore Project development in order to reduce the potential for impacts to the environment. Mitigation for specific identified receptors that will be affected by Underwater Noise (e.g., marine mammals, fish) are discussed and presented in individual chapters and these should be referred to for more information, however an example for marine mammals is outlined in Table 6.2-1.


Table 6.2-1 Underwater Noise Designed In Mitigation Measures

ID	Designed In Mitigation Measure	How the mitigation will be secured
ID004	Measures to mitigate underwater noise and collision risk will be outlined in a Marine Mammal Mitigation Protocol/Plan (MMMP). The MMMP will be developed before construction begins and will take into consideration relevant JNCC guidance on noise impacts, the Scottish Marine Wildlife Watching Code, and use of prescribed routes and set transit speeds where possible.	Secured under Section 36 and/or Marine Licence consent conditions.

6.2.5. SUMMARY OF KEY RECEPTORS, SENSITIVITIES AND LIKELY SIGNIFICANT EFFECTS

The key receptors for Underwater Noise related to the Offshore Project are:

- Marine mammals, as per Southall *et al.* (2019):
 - Low Frequency cetaceans (e.g. minke whale, humpback whale)
 - High Frequency cetaceans (e.g. bottlenose dolphin, long fin pilot whale)
 - Very High Frequency cetaceans (e.g. harbour porpoise)
 - Pinnipeds (e.g. harbour seal)
- Fish species, as per Popper *et al.* (2014):

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- Species with swim bladder involved in hearing (e.g. herring)
- Species with swim bladder not involved in hearing (e.g. salmon)
- Species with no swim bladder (e.g. eels)

6.2.5.1. Likely Significant Effects

The scoping of likely significant effects on Underwater Noise receptors which may arise within the Underwater Noise Study Area via the proposed Offshore Project, are outlined in Table 6.2-2.




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Table 6.2-2 EIA Scoping Assessment for Underwater Noise


Potential Impact	Scoping Result	Justification	Assessment Method
Construction and Decommissioning			
Underwater noise from anchor pile installation for floating WTG moorings and OSP foundation(s) and RCS(s) (fixed)	In	High underwater noise levels generated by piling (anchor or foundation) has the potential to disturb or lead to Permanent Threshold Shift (PTS) for key receptors. Other techniques (drilling, suction caisson) may also generate potentially adverse levels of noise.	Detailed underwater noise modelling, using Southall <i>et al.</i> (2019) criteria for marine mammals and Popper <i>et al.</i> (2014) criteria for fishes.
Underwater noise during decommissioning	In	Decommissioning will occur in excess of 35 years from commissioning, at which time it is expected that the process of shutting down and removal will be much more advanced than now and could utilise techniques that cannot reasonably be predicted at present. Decommissioning has been scoped in on request from NatureScot. Any data relevant to underwater noise that could be generated by equipment associated with decommissioning activities will be sought for in the EIA.	Qualitative assessment based on relevant data available for decommissioning, primarily relating to removal of turbine moorings and cables.

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Potential Impact	Scoping Result	Justification	Assessment Method
Underwater noise from the detonation of UXO	In	High underwater noise levels generated by UXO clearance has the potential to injure or disturb key receptors over a wide area.	Assessment of underwater noise generated by low order and contingency high order UXO clearance.
Underwater noise from construction activities (e.g. vessel noise, cable installation)	In	Underwater noise levels will be present during the construction period that have the potential to disturb key receptors, or lead to PTS.	Simple assessment suitable for relatively low-level or continuous underwater noise levels.
Effect of seabed vibration	In	The input of vibration from piling into the seabed will occur during construction. There is currently no practical methodology available to calculate or assess this potential impact quantitatively, and so it will be considered qualitatively.	Qualitative consideration of potential effects of seabed vibration from piling.
Operation and Maintenance			
Effect of seabed vibration	In	Vibration can be caused during operation of the WTGs. There is currently no practical methodology available to calculate or assess this potential impact quantitatively, and so it will be considered qualitatively.	Qualitative consideration of potential effects of seabed vibration from operational wind turbines.
Operational underwater noise from WTGs and	In	Long term WTG operation over the Array Area could lead to disturbance of sensitive receptors.	Prediction of underwater noise generated by floating turbines of the scale of those intended at Havbredey, using the best available

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Potential Impact	Scoping Result	Justification	Assessment Method
associated mooring lines		For example, WTG operational noise and potential sounds from mooring cables.	data and prediction methodologies at the time of assessment, and including consideration of cable noise effects.
Underwater noise generated from maintenance activities (e.g. vessel noise)	In	Underwater noise levels will be present intermittently that have the potential to disturb key receptors.	Appropriate Assessment suitable for relatively low-level or continuous underwater noise levels.

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6.2.6. PROPOSED APPROACH TO EIA

6.2.6.1. Relevant Data Sources


Data sources listed within Table 6.2-3, alongside further secondary data sources including published and unpublished papers, journals and reports will be used to inform the EIA. These sources may be further supplemented by any additional material identified during stakeholder consultation.

Detailed modelling of the construction of turbine foundations or moorings, or substation platform foundations, will form the basis of the Underwater Noise OWF assessment. A number of models from different suppliers are available that consider relevant parameters, primarily from impact piling as a worst-case scenario for foundation or mooring installation, to calculate the presence of noise surrounding the source. The choice of model will be determined at a later date.

The assessment of underwater noise generated by UXO clearance is based on calculations using techniques published by Soloway and Dahl (2014) and the operational WTG assessment uses data from Tougaard *et al.* (2020), with reference to Bellman *et al.* (2023). Other assessment methodologies are based on the papers and guidance cited below.

Table 6.2-3 Key Sources of Underwater Noise Data and Guidance for Assessment Methodologies

Source	Title
Bellman <i>et al.</i> 2023	Experience report on operational noise: Cross-project evaluation and assessment of underwater noise measurements from the operational phase of offshore wind farms
Popper, <i>et al.</i> 2014	Sound exposure guidelines for Fishes and Sea Turtles
Popper & Hawkins, 2019	An overview in fish bioacoustics and the impacts of anthropogenic sounds on fishes. Journal of Fish Biology
Roberts & Howard, 2022	Biotremology: Physiology, Ecology, and Evolution
Robinson <i>et al.</i> 2014	Good practice guide for underwater noise measurement
Solway & Dahl, 2014	Peak sound pressure and sound exposure level from underwater explosions in shallow water
Southall, <i>et al.</i> 2019	Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects
Tougaard, Hermannsen, & Madsen, 2020	How loud is the underwater noise from operating offshore wind turbines?
Verfuss, <i>et al.</i> 2019 for Scottish Natural Heritage	A review of noise abatement systems for offshore wind farm construction noise, and the potential for their application in Scottish waters

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No baseline underwater noise surveys are proposed for the Offshore Project. Assessments for the adverse impact of underwater noise on key species of marine mammal and fish are based on fixed, absolute thresholds for noise caused by activities relevant to the Offshore Project, which are not dependent on the background noise levels, and do not require a baseline. As such, detailed, local baseline underwater noise studies are not typically undertaken for OWFs.

6.2.6.2. Consultation

Consultation and engagement will be key to confirm the methodology and approach to the assessment. Throughout the duration of the Offshore Project, collaboration between the Offshore Project team and external stakeholders will be established. Organisations that will be consulted with respect to this specific EIA topic, include:

- MD-LOT
- NatureScot

6.2.6.3. Policy, Legislation and Guidance


The assessment of underwater noise will consider the legislation, policy and guidance listed below (Table 6.2-4).

Table 6.2-4 Legislation, Policy and Guidance Relevant to the Underwater Noise Assessment

Relevant Legislation, Policy and Guidance
Legislation and Policy
Marine Strategy Framework Directive and Good Environmental Status
Defra Marine Noise Policy Paper, 2025
Marine environment: unexploded ordnance clearance, Joint Position Statement (Defra, MMO, JNCC, Natural England, The Scottish Govt.)
Guidance
JNCC (2010) Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise
JNCC (2010) Guidelines for minimising the risk of injury to marine mammals from using explosives
JNCC (2025) Guidelines for minimising the risk of injury to marine mammals from explosive use in the marine environment

6.2.6.4. Assessment Methodology

The assessment will follow the methodology described in Chapter 4: Proposed Approach to EIA. Further refinement of the methodology will be undertaken prior to the chapter being written as part of the baseline and stakeholder engagement. Cumulative and transboundary effects are also discussed in Chapter 4: Proposed Approach to EIA, and assessment of these will apply to Underwater Noise.

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The main aim of the Underwater Noise assessment is to further understand and characterise the existing environment in the Underwater Noise Study Area. A greater understanding of the key receptors identified, including fish (Chapter 6.6: Fish and Shellfish Ecology) and marine mammals (Chapter 6.7: Marine Mammals and Other Megafauna), will assist in providing a firm baseline for any potential effect of the Offshore Project.

Magnitude and duration of impact will be considered under the Underwater Noise assessment, alongside the timing and frequency of the activity. The assessment of potential effects will be established using the standard Source-Pathway-Receptor approach. This methodology follows the structure used for assessing underwater noise impacts at other Scottish OWF sites, where the approach has been accepted. Outputs of underwater noise modelling (see below) will be suitable for analysis in relation to impacts on fish (Chapter 6.6: Fish and Shellfish Ecology) and marine mammals (Chapter 6.7: Marine Mammals and Other Megafauna).


6.2.6.5. Modelling

Modelling, as part of the Underwater Noise assessment, calculates the propagation of underwater noise with range based on environmental parameters. Underwater noise modelling typically will take into account the following:

- Size of the anchor pile for WTGs, or fixed foundation pile for OSP(s) and RCS(s)
- Hammer energy (including the effect of soft start)
- Duration of piling
- Strike rate
- Bathymetry at and around the anchor pile or fixed foundation pile
- Any noise mitigation

The WTGs will be of a floating design and while the mooring technique is not confirmed, the use of piled anchors is still in the design envelope. Substation platforms are expected to have fixed foundations. Modelling should account for and assume the effects of driving of piles subsea where this could occur, especially in relation to anchor piles.

Modelling will also take into account the sensitivities of key species of fish and marine mammal present at and in the surrounding region of the Offshore Project, based on the weightings and criteria from the Southall *et al.* (2019) guidelines for marine mammals, and Popper *et al.* (2014) guidelines for fish. Other species, such as shellfish and other invertebrates, will be considered only where accepted data for sensitivity to noise exists. Instantaneous noise levels and cumulative noise exposures will be identified, and the ranges at which onset effects on hearing which cause PTS for affected individuals are expected based on the guidelines. Disturbance as a consequence of any underwater noise produced will also be fully considered. In

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the event that any relevant, alternative, updated guidance is available at the time of assessment, this will be given due consideration and discussed with stakeholders.


Swim speeds during high noise activities such as piling will be an important consideration, as it is considered that those used in recent years for marine mammals are overly precautionary. For the purposes of modelling piling noise and marine mammals, it is proposed to utilise flee speeds as defined in Scottish Natural Heritage (2016) guidance note. Faster swim speeds may also be included if relevant for context. Fish will be assumed to remain stationary in the first instance.

The locations where modelling will be undertaken will be identified in relation to zones of receptor sensitivity (e.g., MPAs or SACs) and particularly water depth, as deeper water tends to lead to greater sound propagation and, therefore, an increased spatial extent of potential noise exposure. Modelling will not be undertaken at every single potential piling location, and consultation will be undertaken with the marine mammal and fish specialists, along with key stakeholders, i.e., MD-LOT and NatureScot, to agree the most appropriate representative locations that ensure a robust assessment.

The characteristics of underwater noise when propagating over long distances is a matter of current research. The recent publication of the Carbon Trust Range Dependent Nature of Impulsive Noise (RaDIN) study (Matei *et al.* 2024) indicates that noise from piling has lost a large amount of its impulsiveness within the first 5 km and thus is likely to present a much lower risk to marine fauna beyond this distance. In this case, species-specific thresholds for ‘non-impulsive’ noise will be calculated and should be considered relevant in the event that PTS is predicted at distances in excess of 5 km.

It is recognised (Popper & Hawkins, 2019) that many fish species are primarily sensitive to the particle motion quantity (effectively the measure of vibration of an individual water particle) of a sound rather than sound pressure, which is used to define criteria in Popper *et al.* (2014). Although there is research underway, little empirical data is available for the level of particle motion that is generated by any of the potentially significant noise sources, and little data is available to predict effect thresholds in respect of particle motion for relevant fish species. The availability of any new data will be monitored, and in the meantime Popper & Hawkins (2019) recommends the continued use of Popper *et al.* (2014).

High intensity sources that directly affect the seabed, such as impact piling, will also generate ground vibration and be transmitted through the substrate. This has the potential to affect benthic and demersal species. While the presence of vibration during piling is expected, an assessment of this has the same limitations as those for particle motion in fish, as little is known of the quantitative influence of the vibration source, or of the sensitivity of relevant species to it. It is proposed that a qualitative assessment is undertaken in reference to seabed vibration, considering the latest research on relevant species at the time.

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For lower-level noise sources such as cable laying activities, drilling, additional vessel presence, or WTG operational noise, a simpler modelling methodology will be utilised, which will provide sufficient detail to predict effects on marine mammals and fish. A simple modelling approach may not take bathymetry or other environmental conditions into account, and as such can be applied to any location in or around the Offshore Project.


There is the potential for UXO to be present at the Offshore Project. For this aspect of the assessment, the attenuation of the noise from UXO detonation will be accounted for in calculations using geometric spreading and a sound absorption coefficient, primarily using the methodologies cited in Soloway and Dahl (2014), which establishes a trend based on measured data in open water. These equations give a relatively simple calculation that can be used to give an indication of the range of effect. The equation does not consider variable bathymetry or seabed type, and thus calculation results will be the same regardless of where it is used. Injury impact ranges for marine mammals and fish as a consequence of UXO clearance will be calculated using Southall *et al.* (2019) and Popper *et al.* (2014) as per the impact piling assessment. The single pulse noise characteristics of UXO clearance is challenging to represent in terms of disturbance, and so the Temporary Threshold Shift (TTS) range will be used for this as per previous Underwater Noise OWF assessments.

Stakeholder consultation will be undertaken at pivotal points throughout the EIA process to ensure that the approach, including the application of the evidence base, satisfies the requirements of both stakeholders and regulators, such as after scoping, prior to commencement, and at the draft production of the chapter during the Offshore EIAR.

6.2.7. SCOPING QUESTIONS FOR CONSULTEES

Scoping questions for consultees in relation to the Underwater Noise assessment include:

1. Have all Underwater Noise receptors and potential impacts that could result from the Offshore Project been identified?
2. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts for Underwater Noise?
3. Do you agree that the assessment methodologies identified are sufficient to inform the Underwater Noise assessment for the EIA and are there any further effect thresholds that are critical to include?
4. Do you agree with the assessment methodology proposed to be undertaken within the Offshore EIAR?
5. Do you agree with the methodology described for assessing the effects of the impacts?
6. Do you agree with the swim speeds identified for calculation of noise exposure during piling, specifically to Low Frequency and Very High Frequency Cetaceans?

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7. Do you agree with the assessment methodology for fish, to focus on sound pressure criteria as presented in Popper *et al.* (2014), on the basis that there are no functional assessment criteria based on particle motion or seabed vibration?

6.2.8. REFERENCES

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6.3. AIR QUALITY AND AIRBORNE NOISE

6.3.1. INTRODUCTION

This chapter of the Offshore Scoping Report provides an overview of the baseline environment for Offshore Air Quality and Airborne Noise within the Array Area and Offshore Cable Corridor Area of Search. It also includes a scoping assessment of likely significant effects for the relevant receptors, from the construction, operation (including maintenance), and decommissioning phases of the Offshore Project.

During the construction phase of the Offshore Project, airborne noise and vibration will be generated from activities such as drilling, piling and the use of vessels. During the operation and maintenance phase, noise and vibration will primarily result from the operating WTGs and vessel activity associated with maintenance operations. Potential impacts on air quality may occur throughout all phases of the Offshore Project due to emissions from vessels, construction machinery, and operational equipment. These emissions have the potential to affect local air quality in the vicinity of the Offshore Project and along vessel transit routes.

It should be highlighted that potential impacts of underwater noise are assessed separately within Chapter 6.2: Underwater Noise and are not addressed in this chapter.


6.3.2. STUDY AREA

The Offshore Air Quality and Airborne Noise Study Area has been defined on the basis of the activities outlined in Section 6.3.1, which will be undertaken to construct and operate the Offshore Project, and in line with the Institute of Air Quality Management (IAQM) guidance.

As highlighted in Figure 6.3-1, Figure 6.3-2 and Figure 6.3-3, the Offshore Air Quality and Airborne Noise Study Area comprises the Array Area, Offshore Cable Corridor Area of Search and Landfall Area of Search. In order to assess potential impacts on air quality at landfall for relevant receptors (see Section 6.3.3.2), the Offshore Air Quality and Airborne Noise Study Area also includes:

- Human receptors (i.e. residential properties and public amenity areas) within 350 m of the Landfall Area of Search
- Designated ecological receptors within 50 m of the Landfall Area of Search

The scoping design envelope extends to MHWS, meaning potential impacts from offshore infrastructure are considered for receptors located below MHWS. To assess the potential impacts to human and ecological receptors appropriately, impacts from offshore infrastructure will be considered for receptors above MHWS within the defined boundaries of the Offshore Air Quality and Airborne Noise Study Area.

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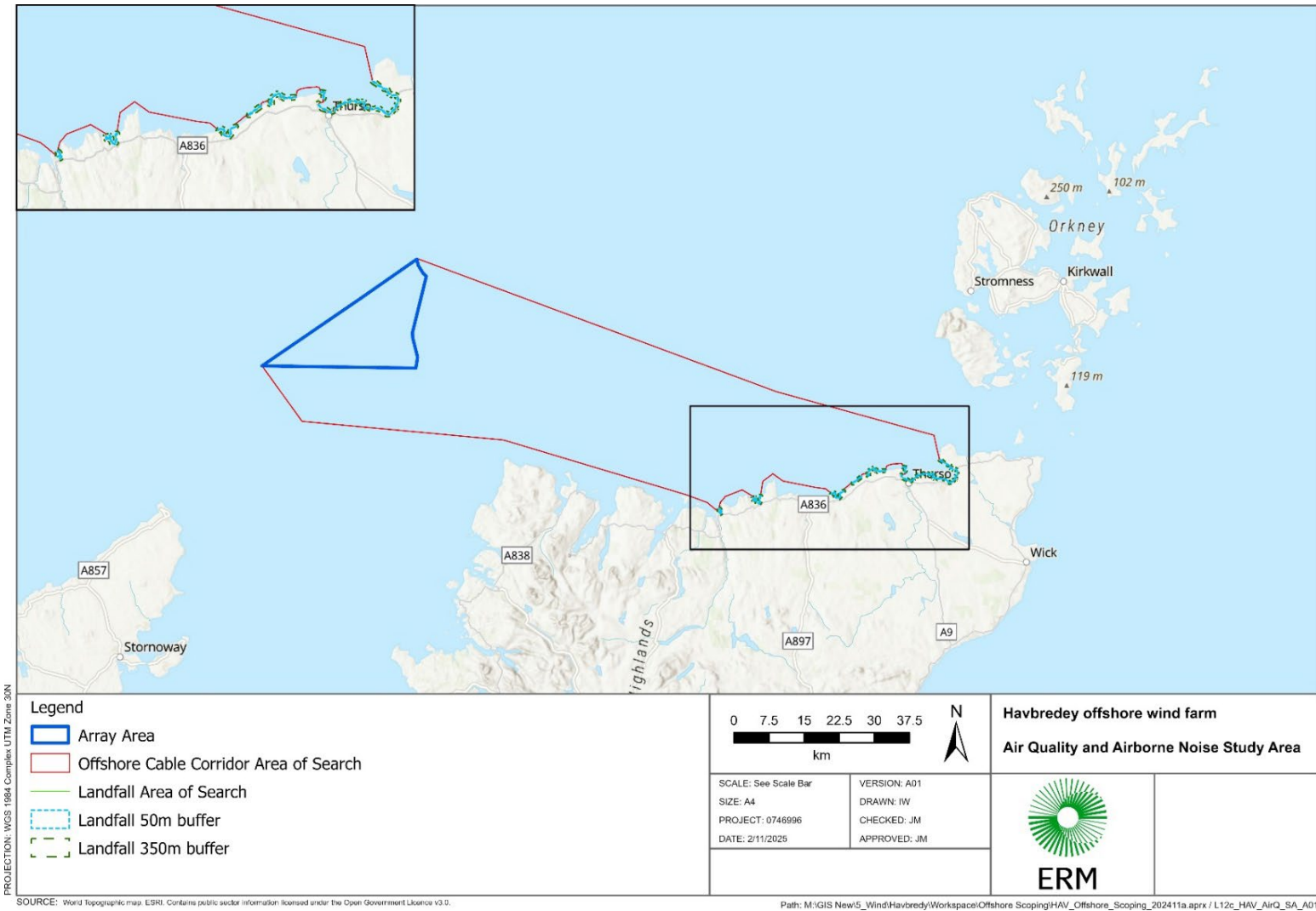


Figure 6.3-1 Offshore Air Quality and Airborne Noise Study Area

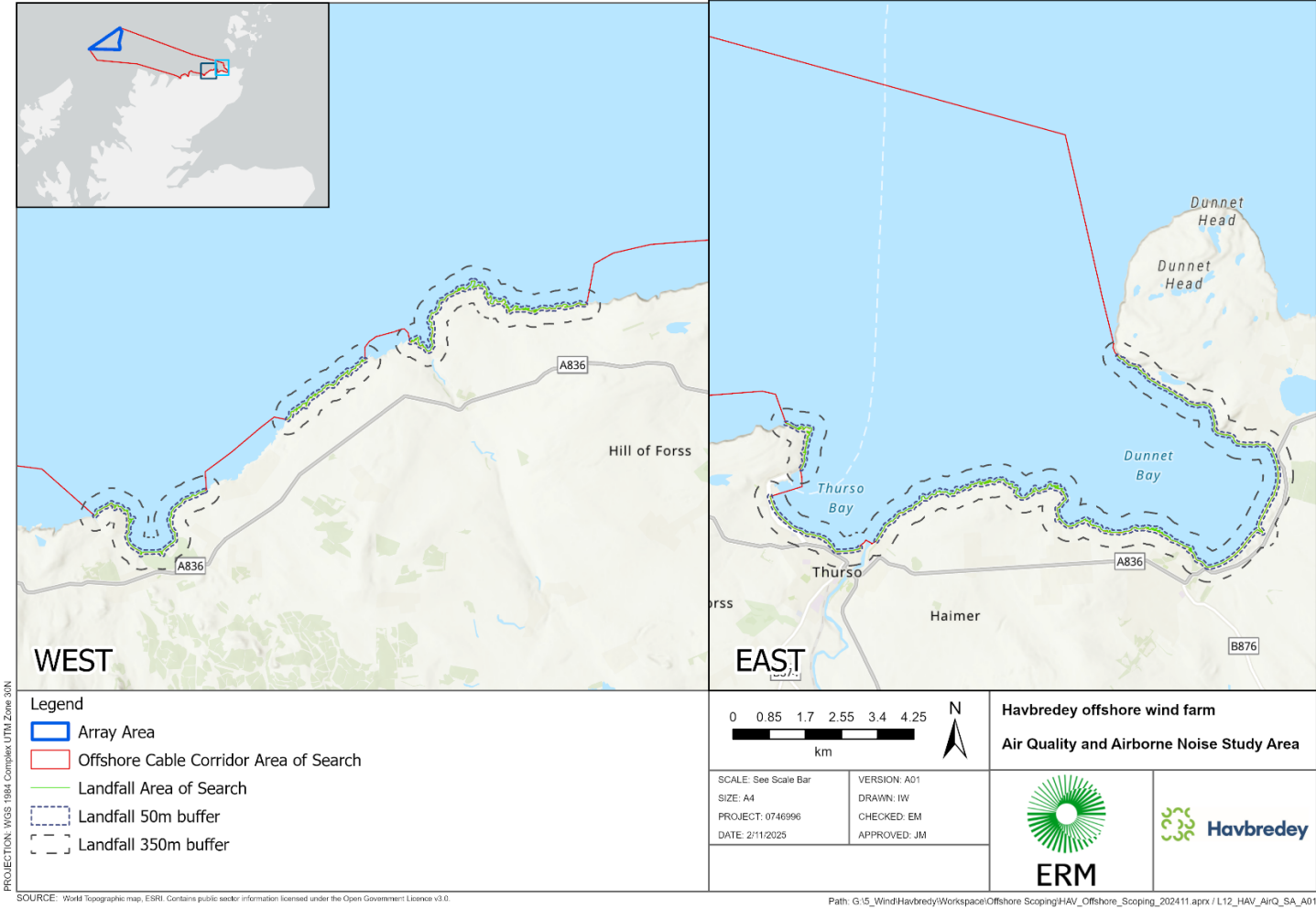



Figure 6.3-2 Offshore Air Quality and Airborne Noise Study Area Close Up 1

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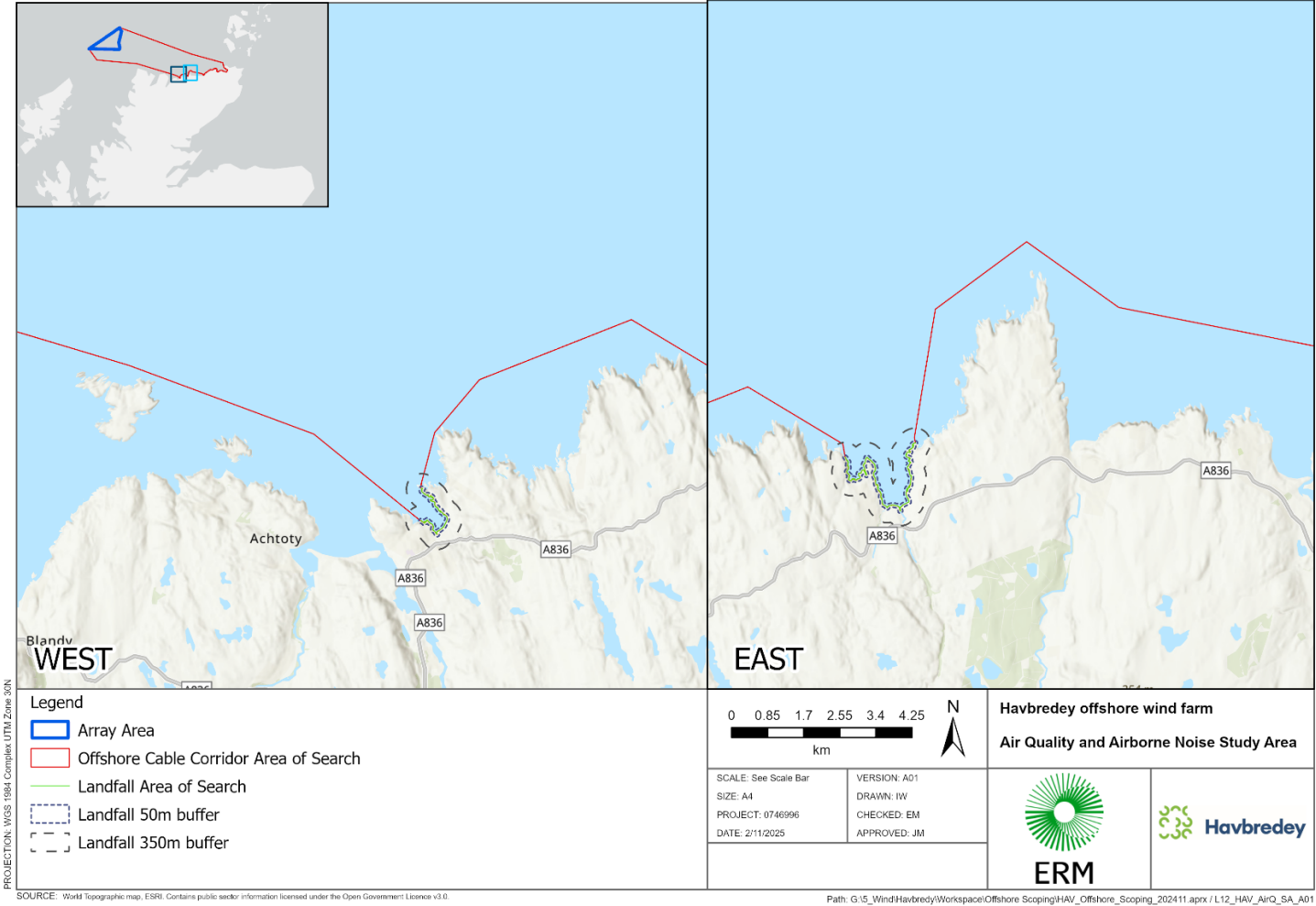



Figure 6.3-3 Offshore Air Quality and Airborne Noise Study Area Close Up 2

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6.3.3. BASELINE ENVIRONMENT

6.3.3.1. Data Sources

Data sources used to inform this Offshore Air Quality and Airborne Noise Chapter of the Offshore Scoping Report are presented in Table 6.3-1.

Table 6.3-1 Summary of Key Data Sources for Offshore Air Quality and Airborne Noise

Source	Spatial Coverage	Year	Summary
IAQM Guidance on the assessment of dust from demolition and construction, version 1.1 (Holman <i>et al.</i> 2014)	UK	2014	Guidance on conducting a construction impact assessment within an air quality assessment or EIA
Department of Energy and Climate Change (DECC) Offshore Energy SEA 3, Appendix 1E: Air Quality	UK	2016	Environmental baseline of air quality across the UK
Cleaner Air for Scotland: The Road to a Healthier Future	Scotland	2015	A national strategy which outlines how the Scottish Government and partner organisations plan to reduce air pollution
Cleaner Air for Scotland 2 - Towards a Better Place for Everyone	Scotland	2021	A new national strategy that replaces 'Cleaner Air for Scotland: The Road to a Healthier Future'
National Atmospheric Emissions Inventory (NAEI) for England, Scotland, Wales, and Northern Ireland: 2005- 2022	UK	2024	Air pollutant emissions inventories for key priority pollutants, covering England, Scotland, Wales, and Northern Ireland for the period 2005 to 2022
Background mapping data for local authorities	UK	2021	Scottish Government and Defra background concentrations maps for nitrogen dioxide (NO ₂) and particulate matter (PM ₁₀) and (PM _{2.5})

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Source	Spatial Coverage	Year	Summary
UK Air Pollution Information System (APIS)	UK	2021	Specialist database on pollutants and their impacts on habitats and species
Air quality in Scotland	Scotland	2025	Scottish Government website providing air quality and pollutant levels around Scotland
Code of practice for noise and vibration control on construction and open sites – Part 1: Noise	UK	2014	British Standards Institution (BSI) guidance including estimation of noise onsite (BS5228-1:2009+A1:2014)
Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration	UK	2014	Assessment criteria for the evaluation of vibration and subsequent human response as provided in British Standard BS5228-2:2009+A1:2014

6.3.3.2. Overview of the Baseline Environment

As part of this Offshore Scoping Report, an initial desk-based review of literature and available data sources (see Table 6.3-1) has been conducted to establish the baseline environment for Offshore Air Quality and Airborne Noise.

The existing air quality within the Offshore Air Quality and Airborne Noise Study Area is influenced by both natural and anthropogenic sources. Natural contributions include wind-driven particulate matter (PM) and sea spray, while anthropogenic emissions are primarily associated with vessel activity. The primary vessel traffic within the Offshore Air Quality and Airborne Noise Study Area consists of ferry traffic transiting from Scrabster to Stromness, fishing vessels and cargo vessels. Key pollutants that currently affect air quality in the Offshore Air Quality and Airborne Noise Study Area include nitrogen oxides (NO_x), sulphur oxides (SO_x), PM, and volatile organic compounds (VOCs). These key pollutants are primarily released from shipping activities (Scottish Government, 2015). While there are currently no other OWF developments within the Offshore Air Quality and Airborne Noise Study Area, vessel activity is expected to increase in the future due to planned offshore wind projects and other marine activities in nearby regions.

Atmospheric pollutant levels across the UK have generally decreased over the past decade, contributing to improved air quality. Data from the NAEI also demonstrate reductions in priority pollutants, such as NO_x, SO_x, and PM, between 1990 and 2022, although ammonia (NH₃) emissions have remained relatively stable during this period (Elliott *et al.* 2024).

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The existing levels of airborne noise within the Offshore Air Quality and Airborne Noise Study Area are generated by a combination of natural and anthropogenic sources. Natural sources include wind, wave action, and precipitation, while anthropogenic noise is primarily associated with vessel activity and military exercises conducted in Practice Exercise Areas (PEXA). Given the low density of existing offshore infrastructure within the Offshore Air Quality and Airborne Noise Study Area, noise levels are expected to remain relatively low, aside from transient peaks associated with vessel traffic or military activities. However, with the anticipated growth in offshore developments and vessel activity due to regional offshore wind projects, background noise levels may gradually increase over time.

6.3.4. DESIGNED IN MITIGATION

The designed in mitigation relevant to the Offshore Air Quality and Airborne Noise assessment, which have been incorporated into the current design of the Offshore Project, is outlined below in Table 6.3-2.


Table 6.3-2 Offshore Air Quality and Airborne Noise Designed In Mitigation Measures

ID	Designed In Mitigation Measure	How the mitigation will be secured
Airborne Noise and Vibration		
ID003	A CEMP and PEMP will be developed prior to construction and adhered to in compliance with legislative requirements and best practice standards and guidance.	Secured under Section 36 and/or Marine Licence consent conditions.
Air Quality		
ID005	A Vessel Management Plan (VMP) will be developed for the Offshore Project prior to construction, including measures for vessel compliance with relevant standards and legislation.	Secured under Section 36 and/or Marine Licence consent conditions.

6.3.5. SUMMARY OF KEY RECEPTORS, SENSITIVITIES AND LIKELY SIGNIFICANT EFFECTS

Sensitive receptors for Offshore Air Quality and Airborne Noise which may be present within the boundaries of the Offshore Air Quality and Airborne Noise Study Area have been identified and grouped into offshore and onshore categories. Receptors include:

- Offshore human receptors including:
 - Commercial shipping vessels (e.g. commercial ferries, cargo vessels, military vessels and search and rescue (SAR) vessels)
 - Commercial fishing vessels

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- Marine recreational users e.g. recreational fishing, sailing and motor cruising, water sports, and Self Contained Underwater Breathing Apparatus (SCUBA) diving
- Onshore human receptors within 350 m of the Landfall Area of Search including:
 - Industrial developments
 - Residential areas
 - Coastal recreation areas
- Onshore and offshore ecological receptors up to 50 m of the Landfall Area of Search including:
 - Designated ecological sites

Ecological receptors within the Offshore Air Quality and Airborne Noise Study Area include one Special Protection Area (SPA), two SACs and eight Sites of Special Scientific Interest (SSSIs). Three of these designated ecological sites have been designated for bird species which may be sensitive to potential changes in air quality and/or airborne noise, including:

- North Caithness Cliffs SPA – designated for breeding Guillemot (*Uria aalge*), Fulmar (*Fulmarus glacialis*), Kittiwake (*Rissa tridactyla*), Peregrine (*Falco peregrinus*), Puffin (*Fratercula arctica*), Razorbill (*Alca torda*), and breeding seabird assemblages
- Dunnet Head SSSI – designated for breeding Guillemot and seabird colony breeding
- Red Point Coast SSSI – designated for breeding Guillemot

6.3.5.1. Likely Significant Effects

The scoping of likely significant effects on Offshore Air Quality and Airborne Noise receptors which may arise within the Offshore Air Quality and Airborne Noise Study Area via the proposed Offshore Project, are outlined in Table 6.3-3.




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Table 6.3-3 EIA Scoping Assessment for Offshore Air Quality and Airborne Noise

Potential Impact	Scoping Result	Justification	Assessment Method
Construction and Decommissioning			
Offshore construction and decommissioning activities generating noise and vibration with potential to impact human and ecological receptors	Out	Airborne noise and vibration generated during construction and decommissioning activities, including potential drilling/piling and cable installation, are expected to have negligible impacts on offshore human receptors, such as shipping and commercial fishing vessels, and ecological receptors due to the transient and short-term nature of these activities. Noise emissions from vessels involved in construction will be low, localised, and comparable to baseline levels from existing vessel traffic in the area. Given the Array Area's offshore location (approximately 27 km from shore), airborne noise and vibration are not anticipated to affect onshore receptors. As such, this impact is scoped out of further assessment.	N/A
Increase in atmospheric pollutants due to construction and decommissioning activities	Out	Exhaust emissions from construction vessels and machinery may increase local concentrations of atmospheric pollutants such as NO ₂ , PM ₁₀ and PM _{2.5} . These emissions are considered to be infrequent and negligible when compared to other offshore shipping activity. The Applicant will ensure all Offshore Project vessels are compliant with relevant standards and legislation, which will be outlined in the VMP.	N/A
Operation and Maintenance			
Offshore operation and maintenance activities generating noise and	Out	Airborne noise and vibration during the operation and maintenance phase will primarily result from operating WTGs and associated maintenance vessel activity. The noise generated by the WTGs is	N/A

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Potential Impact	Scoping Result	Justification	Assessment Method
vibration with potential to impact human and ecological receptors		expected to be minimal and is unlikely to be distinguishable above existing airborne noise levels in the area, such as those generated by vessel traffic. Similarly, noise levels from maintenance vessels are anticipated to be lower than those during the construction phase, localised, and short-term in nature. Considering these factors, the potential for significant impacts on receptors is negligible, and this impact has been scoped out of further assessment.	
Increase in atmospheric pollutants due to operation and maintenance activities	Out	Exhaust emissions from operation and maintenance vessels and machinery may increase local concentrations of atmospheric pollutants such as NO ₂ , PM ₁₀ and PM _{2.5} . These emissions are considered to be infrequent and negligible when compared to other offshore shipping activity. The Applicant will ensure all Offshore Project vessels are compliant with relevant standards and legislation, which will be outlined in the VMP.	N/A

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6.3.6. PROPOSED APPROACH TO EIA

It is proposed that all potential impacts for Offshore Air Quality and Airborne Noise across all phases of the Offshore Project are scoped out of the EIA. This decision is based on the lack of potential for significant impacts to arise from Offshore Project activities. Designed in mitigation measures, such as adherence to the CEMP & PEMP, will further ensure that there is no potential for significant effects. Impacts on air quality and airborne noise have been assessed as localised, transient, and unlikely to exceed baseline levels from existing marine activity in the area. Consequently, no further assessment of Offshore Airborne Noise and Vibration is proposed within the EIA.

6.3.7. SCOPING QUESTIONS FOR CONSULTEES

Scoping questions for consultees in relation to the Offshore Air Quality and Airborne Noise assessment include:

1. Do you agree that the data sources referenced above to inform the baseline are valid for the purposes of this scoping assessment?
2. Have all Offshore Air Quality and Airborne Noise receptors and potential impacts that could result from the Offshore Project been identified?
3. Do you agree with the proposed approach to scope out all potential impacts for Offshore Air Quality and Airborne Noise?
4. Do you agree with the assessment methodology proposed to be undertaken within the Offshore EIAR?
5. Do you agree that the designed in mitigation measures described provide a suitable means for managing and mitigating the relevant potential effects of the Offshore Project on Offshore Air Quality and Airborne Noise receptors?

6.3.8. REFERENCES


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6.4. MARINE SEDIMENT, WATER QUALITY AND WATER FRAMEWORK DIRECTIVE

6.4.1. INTRODUCTION

This chapter of the Offshore Scoping Report provides an overview of the baseline environment for Marine Sediment, Water Quality and Water Framework Directive (WFD) within the Array Area and Offshore Cable Corridor Area of Search. It also includes a scoping assessment of likely significant effects for the relevant pathways and receptors, from the construction, operation (including maintenance), and decommissioning phases of the Offshore Project.

Sediment and water have been considered as both pathways and receptors. The integrity and quality of these physico-chemical elements can be directly or indirectly affected by activities associated with the Offshore Project and, in turn, interact with and function as pathways to other biological and human receptors, e.g. benthic communities, fish and shellfish, birds, marine mammals, fisheries and other users. Importantly, sediment and water quality are statutory quality elements of a WFD designated water body (used to assess the status of the water body) and therefore also considered receptors under the WFD (2000/60/EC).

6.4.2. STUDY AREA

The Marine Sediment, Water Quality and WFD Study Area, shown in Figure 6.4-1, comprises the Offshore Project plus a precautionary buffer of 20 km below MHWS based on the potential extent of sediment transport (physical and coastal process impact pathways) and sediment plume net drift and dispersion, in turn affected by tidal advection (determined by tidal ellipses and tidal excursion length). It includes the WFD Study Area which is defined by designated coastal and transitional water bodies within 3 nm (Scotland designated boundary of the WFD) located within the Marine Sediment, Water Quality and WFD Study Area.

The Marine Sediment, Water Quality and WFD Study Area also includes the Dounreay Food and Environment Protection Act (FEPA) Order Zone, comprising a 2 km spatial buffer in the nearshore area, around Dounreay Nuclear outlet pipeline, established by the Food Protection (Emergency Prohibitions) (Dounreay Nuclear Establishment Order) 1997.

The scoping design envelope extends to MHWS and impacts from offshore infrastructure will consider receptors above MHWS where applicable. It should be noted that the topic-specific study area will vary depending on the nature and scale of each receptor, and/or associated pathway, that could result in a receptor effect.

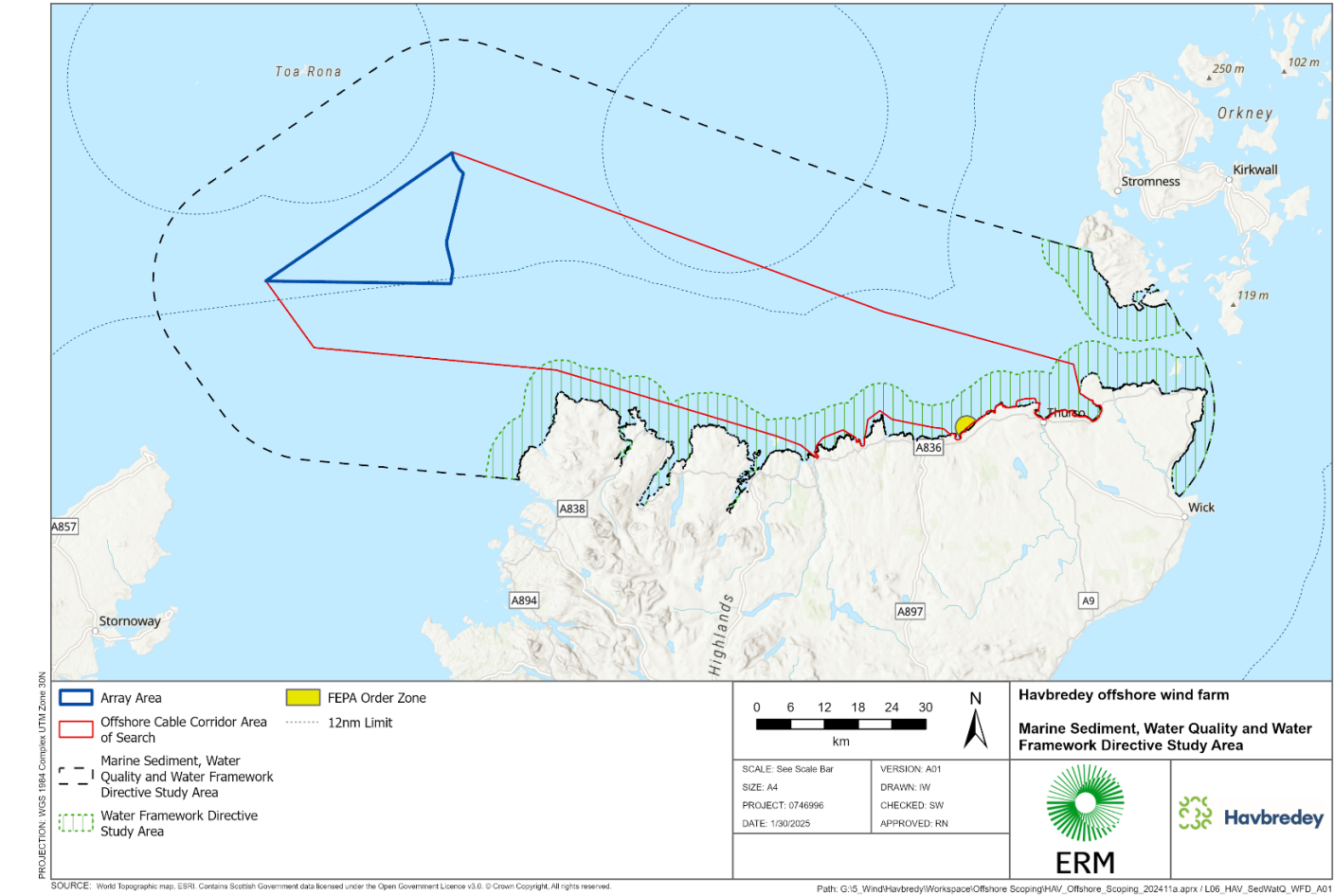



Figure 6.4-1 Marine Sediment, Water Quality and WFD Study Area

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6.4.3. BASELINE ENVIRONMENT

6.4.3.1. Data Sources


Data sources used to inform this Marine Sediment, Water Quality and WFD Chapter of the Offshore Scoping Report are presented in Table 6.4-1. Site-specific surveys will be undertaken for the Offshore Project, and where available at the time of writing will be used to inform the Offshore EIAR.

Table 6.4-1 Summary of Key Data Sources for Marine Sediment, Water Quality and WFD

Source	Spatial Coverage	Year	Summary
ABPmer UK Renewables Atlas	UK	2008	Mean spring tidal range, tidal currents
British Oceanographic Data Centre (BODC) - Clean Seas Environmental Monitoring Programme	UK	-	Oceanographic datasets
BGS	UK	2022	Seabed morphology and bathymetry, sediment types, sediment quality
Centre for Environment, Fisheries and Aquaculture Science (Cefas) – Suspended sediment climatologies around the UK (Cefas, 2016)	UK continental shelf (UKCS)	2016	Concentrations and distribution of suspended sediments
Cefas – Monthly average non-algal Suspended Particulate Matter concentrations (Silva, 2016)	UK	2016	Data from surveys on suspended solids in UK waters
Clean Seas Environmental Monitoring Programme (CSEMP)	Scotland	2020	Data from field campaigns
Dounreay and Nuclear Restoration Services https://www.gov.uk/government/organisations/nuclear-restoration-services	Dounreay and FEPA order zone	2024	Decommissioning information and radioactivity data
EMODnet - EMODnet broad-scale seabed habitat map for Europe 2019 (EUSeaMap)	UK and Europe	2021	Modelling distribution of EUNIS substrate classifications
ICES – Oceanographic data	UK	2021	Dataset on temperature and salinity data

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Source	Spatial Coverage	Year	Summary
JNCC – Coasts and seas of the UK, Regions 3: North-west Scotland	UK; Western Isles and west Highland	1997	Summary of environmental, geological, and ecological aspects
MD – Annual Cycles of Physical, Chemical and Biological Parameters in Scottish Waters 1960-2012	West Hebrides	2014	Oceanographic data
MD – Monthly average sea surface temperatures (SSTs) for 13 Scottish Sea Areas	Scotland	2016	Average SSTs
MD – Sedimentary organic carbon quality and reactivity (Smeaton and Austin 2022)	Stations within Scotland coastal waters	2022	Carbon and organic matter content of sediments
MD - Scotland's National Marine Plan Interactive (NMPI)	Scotland	2024	Data viewer
NatureScot - Scottish Natural Heritage (SNH) Trends, The seas around Scotland 2004	Scotland	2004	Overview of the seas around Scotland including ecology
Oslo-Paris Convention (OSPAR) - Intermediate Assessment 2017. Contaminants assessment	Celtic Seas and North Atlantic	2017	OSPAR region III data on Celtic seas
Robinson A., Eddies in Marine Science - Chapter 7 the northeast Atlantic Ocean (Gould W.)	Northeast Atlantic Ocean	1983	Oceanography
Pentland FLOW EIAR	Within Offshore Cable Corridor Area of Search	2022	Water and sediment quality baseline
SEPA - Atlas of Coastal Classification and Environmental Data	Scotland	2020	Charts and data queries on water bodies and marine environment
SEPA - Bathing Waters https://informatics.sepa.org.uk/BathingWaters/	Scotland	2023	Designated bathing water locations and status
SEPA - Radiological Habits Survey: Dounreay 2018	Dounreay	2018	Radioactivity information
SEPA - Shellfish Waters	Scotland	2023	Designated shellfish water locations and status

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Source	Spatial Coverage	Year	Summary
SEPA- Water bodies data sheets	Scotland	2024	WFD water bodies
SEPA- Water Environment 2019: A Summary and progress report	Scotland	2019	WFD water bodies
UKHO	Scotland	2023	Hydrographic surveys
Urban waste water treatment directive sensitive areas 2019	Scotland	2019	Sensitive areas
West of Orkney OWF EIAR	Partial overlap with Offshore Cable Corridor Area of Search	2023	Water and sediment quality baseline


6.4.3.2. Overview of the Baseline Environment

An initial desk-based review of literature and available data sources (see Table 6.4-1) has been undertaken to support this Offshore Scoping Report; the findings are presented below, to provide an understanding of the baseline environment for the Marine Sediment, Water Quality and WFD chapter.

The Marine Sediment, Water Quality and WFD Study Area is located near to the Outer Hebrides to the west and within the Orkney archipelago to the east, and mainland Scotland (the Highlands) to the south. Readily available, *in situ* baseline data are available from EIARs prepared for two OWFs and that have been recently consented or are in the planning stage: the Pentland FLOW and the West of Orkney OWF.

The Marine Sediment, Water Quality and WFD baseline considers the following receptors and/or parameters:

- Water quality:
 - Physical properties (salinity, temperature, turbidity and dissolved oxygen (DO))
 - Chemical properties (macronutrients such as dissolved nitrogen and phosphorous (P) concentrations, chlorophyll- α concentration and Environmental Quality Standards (EQS) priority substances)
- Sediment Quality:
 - Physical properties (particulates size and total organic matter (TOM))
 - Chemical properties (metals, organotins, hydrocarbons including polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and radioactive isotopes concentrations)
- WFD designated water bodies and their quality elements used to assess the surface water status of a water body:
 - Hydromorphology
- Biology:

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- Benthic habitats
- Fish
- Water quality:
 - Phytoplankton
 - Chemicals concentrations
 - Sediment quality
- Protected areas:
 - SACs and Special Protected Areas (SPAs)
 - Bathing waters
 - Shellfish waters
- INNS

6.4.3.3. Quality Assessment, Standards and Thresholds


To characterise marine water and sediment quality and determine the presence/absence of pollution, a number of environmental standards and guidelines are applicable. For instance, in the UK, EQS are statutory thresholds, setting out limits for various priority substances and hazardous priority substances in water. These thresholds help ensure that water quality remains within safe limits for both ecosystems and human use. Regular monitoring and compliance with these standards are crucial for maintaining healthy waters and WFD water bodies.

For the UK, statutory seabed sediment quality standards have yet to be established. Therefore, to assess potential contamination and pollution in offshore and nearshore seabed sediments, *in situ* values of physico-chemical variables are contextualised against thresholds set out in the Action Levels guidelines (MMO, 2014; Marine Scotland, 2017).

Action Levels for disposal of dredged material defined by Cefas are considered common practice to use (MMO, 2014). In Scotland, the MD has published similar guidelines specific to the region, although it should be noted that these are not statutory (Marine Scotland, 2017). In general, contaminant levels in dredged material below Action Level 1 (AL1) are of no concern and safe for disposal. However, dredged material with contaminant levels above Action Level 2 (AL2) is generally considered unsuitable for sea disposal and where compounds levels lie between AL1 and AL2, further consideration must be made before disposal (stakeholder engagement based). Current Action Levels are shown in Table 6.4-2.

Table 6.4-2 Action Levels (from Marine Scotland, 2017)

Contaminant/Compound	Action Level 1 mg/kg Dry Weight (ppm)	Action Level 2 mg/kg Dry Weight (ppm)
Arsenic	20	70

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Contaminant/Compound	Action Level 1 mg/kg Dry Weight (ppm)	Action Level 2 mg/kg Dry Weight (ppm)
Mercury	0.25	1.5
Cadmium	0.4	4
Chromium	50	370
Copper	30	300
Nickel	30	150
Lead	50	400
Zinc	130	600
*Organotins; Tributyltin (TBT), Dibutyltin (DBT), Monobutyltin (MBT)	0.1	1
PCB's	0.02	0.18
PAH	0.1	-
Total Hydrocarbons (THC)	100	-
*Dichlorodiphenyltrichloroethane (DDT)	0.001	-
*Dieldrin	0.005	-


*Data supplemented from Cefas Action Levels (MMO, 2014).

Other standards, such as the Canadian Council of Minister of the Environment (CCME) environmental quality guidelines (CEQGs) are often employed for comparison purposes (CCME, 1999). In the absence of threshold values for hydrocarbon compounds, the Dutch quality standards from the Dutch National Institute for Public Health and the Environment's (Rijksinstituut voor Volksgezondheid en Milieu (RIVM)) can be used as a supporting tool (Hin *et al.* 2010).

6.4.3.4. Environmental Characterisation

The offshore area of the northeastern Atlantic continental shelf is characteristically seasonally stratified. Shallower nearshore waters are predominantly mixed all year round due to turbulent mixing, driven by the high energy environment shaped by tidal currents, waves mixing and wind shear stress, which aids vertical mixing.

The area is characterised by semidiurnal tides, with tidal movement propagating north along the western continental shelf and then eastward across northern Scotland (Neill *et al.* 2017). The mean tidal range is approximately 4 m, with tidal currents averaging about 1-1.5 m/s (Neill *et al.* 2017).

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Waters around the Scottish northeast Atlantic have an annual average SST ranging from 6.5 to 15°C, with an average sea surface salinity (SSS) of approximately 34.5 practical salinity units (PSU), depending on the season (Lozier *et al.* 1995; JNCC, 1997; OSPAR, 2000; Marine Directorate, 2016).

6.4.3.5. Water Quality


Cefas (Silva, 2016) data show that monthly averages of non-algal suspended particulate matter (SPM) and turbidity, measured in nephelometric turbidity units (NTU), is generally low offshore in northern Scotland, with values of 0.7-1.0 mg/l and ≤ 3 NTU, respectively. Total suspended solids (TSS) concentrations show seasonal peaks in winter (turbulence driven) and increase slightly in the Array Area (West of Orkney Windfarm field data), due to an increase in finer seabed sediment concentration (Ocean Infinity, 2023) but remain low throughout at < 5 mg/l (high TSS concentrations are considered to be > 35 mg/l).

In-situ data on surface DO remained high throughout the Marine Sediment, Water Quality and WFD Study Area with concentrations > 7.5 mg/l, corresponding to 90-106% saturation (percentage of saturation is temperature and salinity dependent). These levels are influenced by seasonal changes in temperature and salinity, which affect oxygen solubility and surface waters gas exchange dynamics (Marine Scotland, 2014).

Satellite imagery of monthly average chlorophyll- α (Chl- α) concentrations around the UKCS (Ghohin, 2011; OSPAR, 2017) indicates that during the productive spring bloom season (April-June), Chl- α levels within the vicinity of the Offshore Project peak at around 5 mg/m³ in coastal areas. This is well below the levels observed during eutrophication peaks in the southern North Sea (Ghohin, 2011; OSPAR, 2017). Primary production is directly influenced by dissolved inorganic macro- and micro-nutrients availability, temperature and light availability (photosynthetically available radiation (PAR)).

Dissolved inorganic nitrogen (DIN) and dissolved inorganic phosphorous (DIP) concentrations are low offshore in northern Scotland and typical of unpolluted waters. Salinity normalised DIN concentrations within the Marine Sediment, Water Quality and WFD Study Area remain below the average of background concentrations < 12 μ m (NMPI, 2024: 2012 to 2019 data). DIP concentrations offshore remain primarily below background concentrations < 0.6 μ m, with concentrations increasing near the coast of the Orkney archipelago and around the coastal area of Cape Wrath but remaining within average background levels (0.6 – 0.8 μ m) (NMPI, 2024: 2012 to 2019 data).

Under the WFD a number of polluting compounds are periodically monitored in surface waters (Section 6.4.3.7). These chemicals are listed as statutory EQS priority substances and hazardous priority substances. Currently, all the designated water bodies located within the Marine Sediment, Water Quality and WFD Study Area are in Good Chemical Status which means that the water's chemical composition meets the required EQS (unpolluted) for all substances considered. Therefore, the chemical composition of the water

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present in the Marine Sediment, Water Quality and WFD Study Area is expected to be similar to that recorded for typical unpolluted coastal/offshore Atlantic waters.


6.4.3.6. Sediment Quality

In situ characterisation of the sediment physico-chemical properties was carried out through surveys executed to inform the West of Orkney OWF EIAR and the Pentland FLOW EIAR (Ocean Infinity, 2023; Xodus, 2023).

Unconsolidated sediments are a sink for pollutants where particle size and the amount of organic matter present in the sediment can significantly affect its adsorption capacity. Finer sediments with larger surface areas, such as silts and clays, can attract and hold a significant amount of contaminants.

EMODnet seabed substrate data (EMODnet, 2023) and Particulate Size Analysis (PSA) from the West of Orkney OWF (Xodus, 2023) overlapping the Marine Sediment, Water Quality and WFD Study Area, show that the unconsolidated sediments within the Marine Sediment, Water Quality and WFD Study Area comprised primarily coarser fraction material, varying between different fractions of sand and gravels, with gravelly sands and sandy gravels overall dominating the substrate (Xodus, 2023). TOM remained low throughout, ranging from 0.8% to 2.4% (high concentration reference value >5%).

A general overview of the seabed type expected in the Marine Sediment, Water Quality and WFD Study Area is shown in Figure 6.4-2 (EMODnet, 2023). The figure shows predominantly sand and coarse substrate with some rocks/boulders within the Marine Sediment, Water Quality and WFD Study Area.

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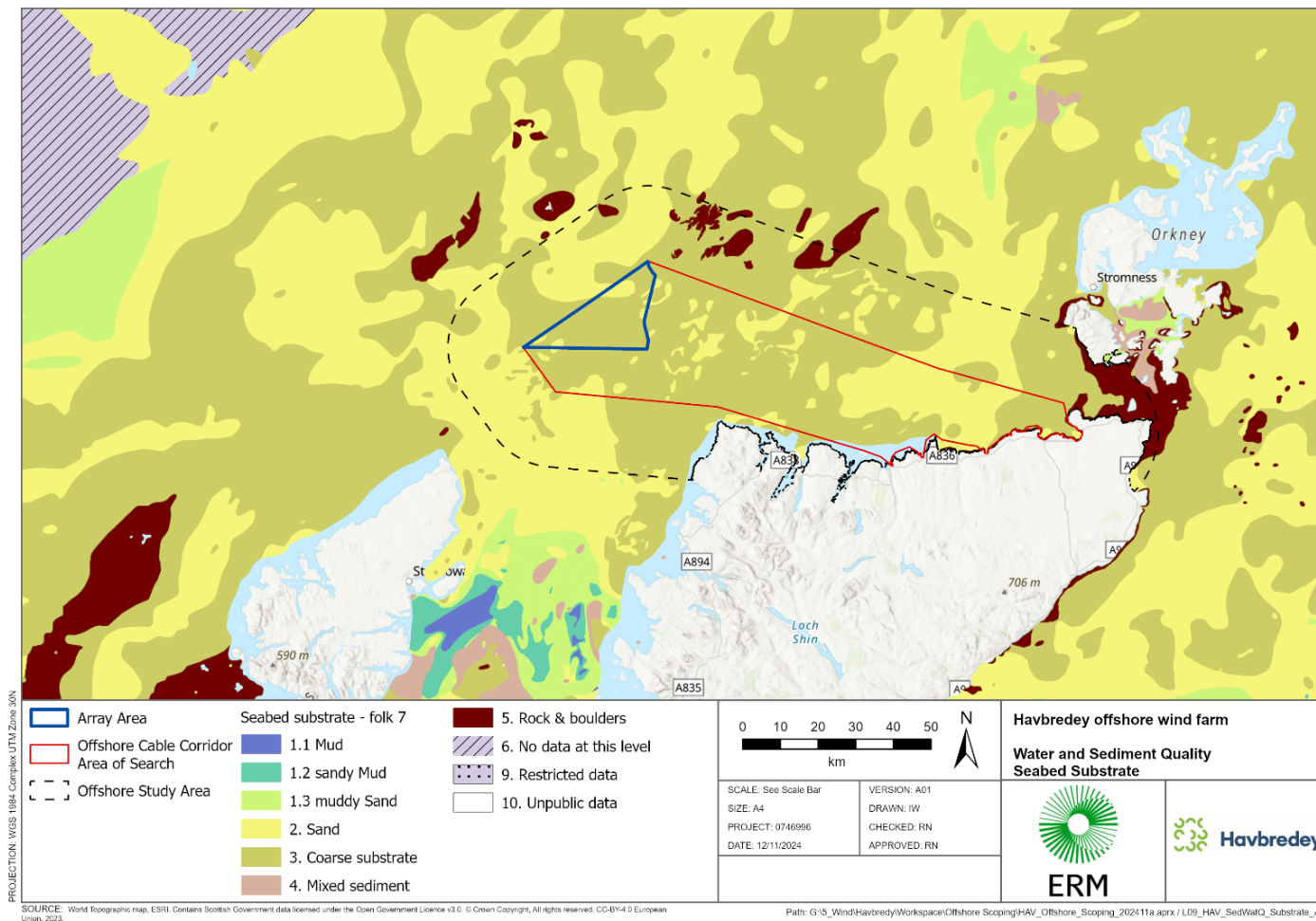



Figure 6.4-2 Marine Sediment, Water Quality and WFD Study Area Substrate Mosaic and Seabed Characterisation

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Overall, contaminant concentrations for the West of Orkney OWF survey area were low. Metal concentrations (Arsenic, Chromium, Copper, Lead, Zinc, Cadmium and Mercury) remained below AL1 throughout the West of Orkney OWF survey area except for Nickel, which concentrations were found slightly above AL1 at a total of 8 sampling stations (out of 59) but, below AL2 criteria (Xodus, 2023).

West of Orkney OWF data shows that organotin (MBT, DBT and TBT) concentrations remained below the Limit of Detection (LoD) or well below AL1 throughout the West of Orkney OWF survey area. THC concentrations remained variable but low (range: <1,000 to 27,600 µg/kg) not exceeding the Dutch RIVM thresholds of 5,000,000 µg/kg. PAH concentrations were low, slightly increasing with proximity to the coast but remained below the AL1 criteria. Similarly, PCB concentration across the West of Orkney OWF survey area remained below AL1 throughout.


Overall, the north and northwest of Scotland water and sediment quality typically show minimal anthropogenic contamination. These regions have had lower historical and current hydrocarbon inputs compared to the mature oilfields in the east. Persistent compounds such as PCBs and other pollutants, such as metals, can be found at low levels, although certain areas may exhibit localised elevations due to historical inputs (Baxter *et al.* 2011; Marine Scotland 2020).

FEPA order zone

The Dounreay and Vulcan nuclear sites ceased operations in 1994 and are currently undergoing decommissioning. Historically, there have been instances of radioactive particle leaks into the surrounding waters. Therefore, the site including a 2 km radius of the historic Liquid Effluent Discharge System (LEDS), is under a FEPA order zone. The FEPA zone prohibits the harvesting of seafood to prevent the potential release of radioactive contaminant. Recent data (2021-2022) show that particles classified as Minor (Cs-137 activity of <100 kilobecquerel (kBq)), Relevant (Cs-137 activity of between 100 kBq and 1 MBq) and Significant (Cs-137 activity of >1 MBq) have all been found at the Dounreay foreshore and Sandside Beach (Dounreay, 2023). However, under the current criteria, no Relevant or Significant particles were found at the Murkle and Strathy beaches. Environmental surveys undertaken for the Pentland FLOW in 2021 did not detect a significant concentration of radioactive isotopes in samples outside the FEPA order zone. Samples obtained from the northern edge of the FEPA order zone tested positive for Americium-241 at 0.0064 Bq/g however, the concentrations remained very low and not significant (Xodus, 2023).

6.4.3.7. Water Framework Directive

In Scotland, coastal and transitional surface waters up to 3 nm (5.5 km) are included within Scotland's River Basin Management Plans (RBMPs), under the Water Environment and Water Services (Scotland) Act 2003 (WEWS) and the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (CAR), (implementing Directive 2000/60/EC). This act requires any projects that have the potential to interact with surface waters to consider compliance with the WFD, to ensure that water bodies achieve or maintain a

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‘Good Ecological Status’ (GES) or ‘Good Ecological Potential’ (GEP). SEPA is the responsible authority to secure compliance with the WFD.

Surface water status looks at both the chemical status and the ecological (including biological and habitat condition) status of a water body. Chemical status comprises around 50 priority substances. Other chemicals are included as elements in ecological status. Chemical and ecological status are reported separately but are combined as an overall status. Under the WFD the one-out-all-out approach means that if just one quality element fails good status, the overall water body classification will be less than good.

Bathing waters and shellfish waters are sites protected under the WFD and WEWS and have also achieved specific protection under their own directives (Bathing Waters Directive (BWD) 2006/7/EC and Shellfish Waters Directive (SWD) 2006/113/EC)). These directives set specific standards for environmental parameters that need to be regularly monitored and maintained.

The assessment of the impacts from the Offshore Project activities on compliance with the WFD has utilised the generic environmental objectives outlined in Article 4.1 of the WFD (as stated in Article 9.7 of the WEWS). The key points include:

- Prevent Deterioration: must implement measures to prevent the deterioration of the status of all surface water and groundwater bodies
- Achieve GES: must protect, enhance, and restore all bodies of surface water and groundwater with the aim of achieving GES, or GEP by specified deadlines
- Ensure compliance with environmental objectives for water bodies and protected areas

The WFD Compliance Assessment methodology is completed in the following stages:

- Stage 1 Screening: identify activities associated with the Offshore Project (at each stage) that have the potential to have an impact, and identify the water bodies hydrologically connected to the Offshore Project activity
- Stage 2 Scoping: identify the potential risks to each water body and each receptor
- Stage 3 Impact Assessment: assess the hydrological connectivity (pathway) of the Offshore Project activities (source) on the WFD water bodies and other statutory receptors

A number of WFD designated water bodies lie within and downstream of the Offshore Project, which includes the Array Area and the Export Cable Corridor Area of Search, as shown in Figure 6.4-3. Water bodies within the Marine Sediment, Water Quality and WFD Study Area (i.e. a 20 km buffer around the Offshore Project) have been considered and are detailed in Table 6.4-3. It should be noted that the buffer zone is effects range dependent and will be revisited in the EIA report.



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Table 6.4-3 WFD Designated Water Bodies in the Proximity to the Offshore Project

Water Body	Category	Overall Status (2022)	Area Size (km ²)	Distance from Offshore Project (km)
The Minch North (ID 200221)	Coastal	Good	2,826	Within Offshore Cable Corridor Area of Search
Cape Wrath (ID 200220)	Coastal	Good	126	Within Offshore Cable Corridor Area of Search
Cape Wrath to Strathly Point (ID: 200223)	Coastal	Good	439.1	Within Offshore Cable Corridor Area of Search
Strathly Point to Dunnet Head (ID 200224)	Coastal	Good	274.2	Within Offshore Cable Corridor Area of Search
Thurso Bay (ID 200218)	Coastal	Good	5.8	Within Offshore Cable Corridor Area of Search
Dunnet Bay (ID 200217)	Coastal	Good	9.3	Within Offshore Cable Corridor Area of Search
Scourie (ID 200367)	Coastal	Good	261.6	18 from Offshore Cable Corridor Area of Search
Dunnet Head to Duncansby Head (ID 200225)	Coastal	Good	179	2.3 from Offshore Cable Corridor Area of Search
Old Head to Tor Ness (ID 200222)	Coastal	High	197	7.6 from Offshore Cable Corridor Area of Search
Scapa Flow (ID 200222)	Coastal	Good	263.5	17 from Offshore Cable Corridor Area of Search
Tor Ness to Breck Ness (ID 200231)	Coastal	High	97	7.6 from Offshore Cable Corridor Area of Search
Sule Skerry and Sule Stack (ID 200239)	Coastal	High	194	12 from Offshore Cable Corridor Area of Search

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Water Body	Category	Overall Status (2022)	Area Size (km ²)	Distance from Offshore Project (km)
Rona (ID 200241)	Coastal	Good	57	20 from Array Area
Kyle of Durness (ID 200216)	Coastal	Good	6.6	3.5 from Offshore Cable Corridor Area of Search
Loch Eriboll (ID 200214)	Coastal	Good	38	4.5 from Offshore Cable Corridor Area of Search
Kyle of Tongue (ID 200213)	Coastal	Good	14.5	6.1 from Offshore Cable Corridor Area of Search

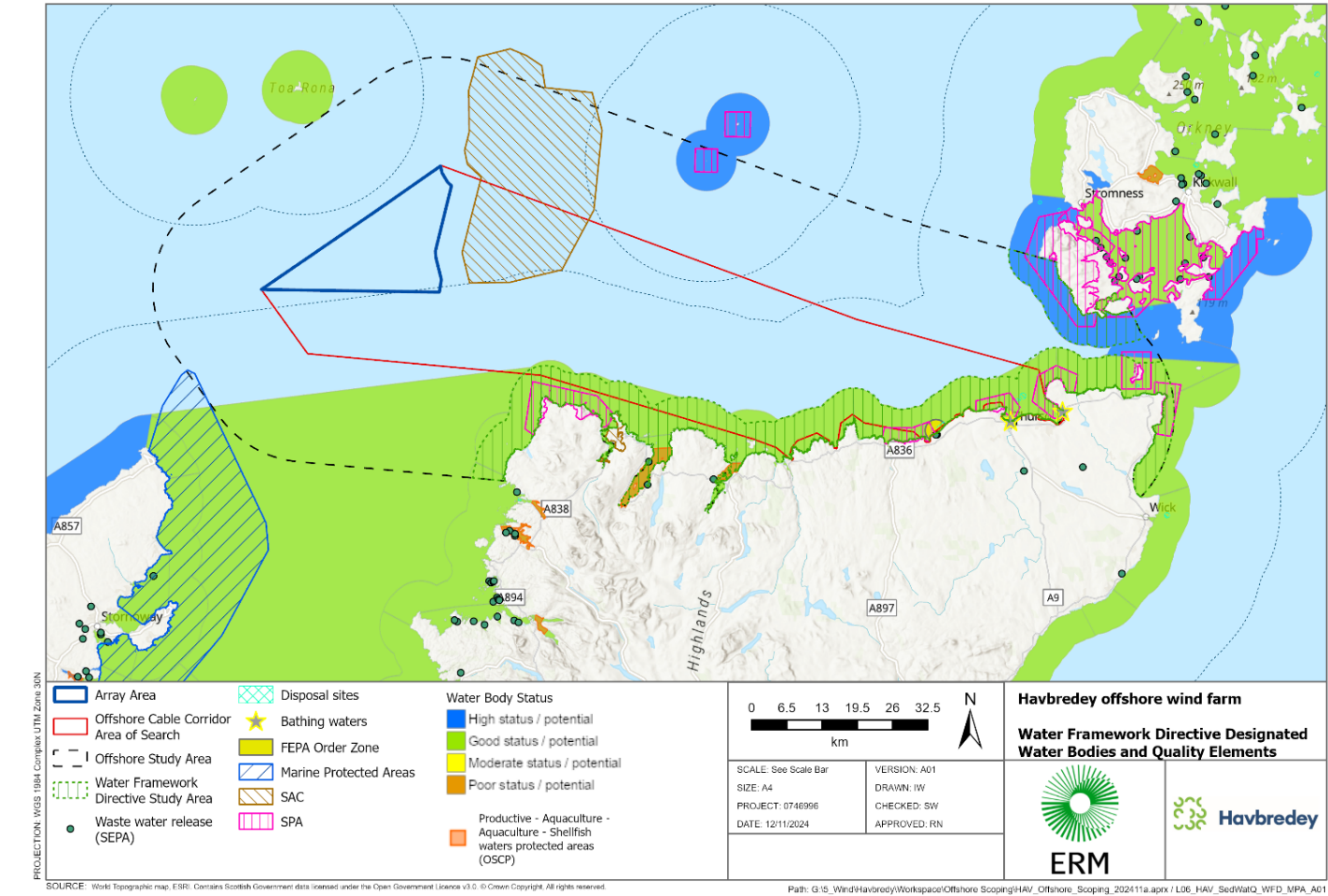



Figure 6.4-3 Water Framework Directive Designated Water Bodies and Quality Elements

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The conditions of the quality elements (physical, chemical and biological) of a water body determine its ecological and chemical status. The baseline conditions of the physical and biological parameters (including INNS) of the WFD Study Area (up to 3 nm from the coast), are included and discussed in Chapter 6.1: Physical and Coastal Processes; Chapter 6.5: Benthic and Intertidal Ecology; and Chapter 6.6: Fish and Shellfish Ecology. The chemical conditions of the WFD Study Area have been included in the Water Quality and the Sediment Quality Sections 6.4.3.5 and 6.4.3.6 above. The protected areas quality elements have been discussed below.

Bathing waters are monitored by SEPA and water is tested for the bacteria *Escherichia coli* and Intestinal *enterococci*. Cell counts above 500 cfu/100 ml are indicative of low water quality (SEPA, 2024). There are 2 designated bathing water located within the Offshore Cable Corridor Area of Search:

- Thurso (ID: UKS7616019) classified as Good
- Dunnet (ID: UKS7616085) classified as Excellent

The closest designated shellfish waters are located >2 km from the Offshore Cable Corridor Area of Search, within the water bodies of:

- Kyle of Tongue: Kyle of Tongue (SWPA22) located 6.1 km south of the Offshore Cable Corridor Area of Search
- Loch Eriboll: Loch Eriboll (SWPA35) located 4.5 km south of the Offshore Cable Corridor Area of Search

Outside of the WFD Study Area however, the potential effects of the Offshore Project on shellfish species have been addressed in Chapter 6.6: Fish and Shellfish Ecology.

A number of urban wastewater release sites are scattered along the coast, Thurso bathing water has been designated as sensitive to the effects of sewage discharges, in accordance with the Urban Waste Water Treatment (Scotland) Regulations (1994).

Nitrate Vulnerable Zones (NVZ) are mainly terrestrial and associated with agricultural land however, they are considered as sources of potential diffused macronutrients pollution as a result of land and rivers run off. There are no NVZs in the WFD Study Area. The closest NVZ is the Aberdeenshire, Banff, Buchan and Moray (defined as area 4 in the NVZ list).

A number of WFD protected areas and UK National Network sites (including SACs and Special Protected Areas (SPAs)) are located within 2 km of the coastal water bodies (boundary set by WFD assessment guidelines) as detailed in Table 6.4-4. Terrestrial protected areas have been excluded. A separate HRA will assess the potential effects of the Offshore Project activity on relevant designated nature conservation sites.


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Table 6.4-4 WFD Protected Areas and UK National Network Sites Located Within 2 km of the Relevant Water Body


Protected Area	Designation	Relevant Water Body	Distance from Offshore Project (km)
Cape Wrath	SPA	Cape Wrath to Strathy Point (ID: 200223)	0.66 west of Offshore Cable Corridor Area of Search
Durness	SAC	Kyle of Durness (ID 200216)	2.23 west of Offshore Cable Corridor Area of Search
North Caithness Cliffs	SPA	Strathy Point to Dunnet Head (ID 200224)	Within Offshore Cable Corridor Area of Search
Scapa Flow	SPA	Old Head to Tor Ness (ID 200222)	16.5 south east of Offshore Cable Corridor Area of Search

6.4.4. DESIGNED IN MITIGATION

The designed in mitigation relevant to the Marine Sediment, Water Quality and WFD assessment, which have been incorporated into the current design of the Offshore Project, is outlined below in Table 6.4-5.

Table 6.4-5 Marine Sediment, Water Quality and WFD Designed In Mitigation Measures

ID	Mitigation Description	How the measure will be secured
ID003	A CEMP and PEMP will be developed prior to construction and adhered to in compliance with legislative requirements and best practice standards and guidance.	Secured under Section 36 and/or Marine Licence consent conditions.
ID006	The Project will adhere to requirements of relevant international conventions, including the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78.	Secured under Section 36 and/or Marine Licence consent conditions.
ID007	Best practice techniques will be employed through all phases of the Project, and measures will be provided in a Marine Pollution Contingency Plan (MPCP), which will form part of the CEMP and PEMP. Shipboard Oil Pollution Emergency Plans (SOPEPs) will be developed for the Project prior to construction.	Secured under Section 36 and/or Marine Licence consent conditions.

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ID	Mitigation Description	How the measure will be secured
ID008	Best practices will be followed throughout the Offshore Project regarding the establishment of procedures to retrieve dropped objects.	Secured under Section 36 and/or Marine Licence consent conditions.
ID009	Compliance with the International Convention for the Control and Management of Ship's Ballast Water and Sediments and adherence to INNS Management Plan to reduce the risk of introducing or spreading invasive species.	Secured under Section 36 and/or Marine Licence consent conditions.

6.4.5. SUMMARY OF KEY RECEPTORS, SENSITIVITIES AND LIKELY SIGNIFICANT EFFECTS

The key receptors for Marine Sediment, Water Quality and WFD are:

- Water quality
- Sediment quality
- WFD designated water bodies and their quality elements
- Bathing waters
- Shellfish waters

A number of Offshore Project activities (during the construction, operation and maintenance, and decommissioning phases) have the potential to cause an impact on the identified receptors, these include:

- Vessels operations
- Trenching and excavation (including HDD)
- Installation of infrastructure
- Remedial works
- Presence of infrastructure on the seabed and water column

6.4.5.1. Likely Significant Effects

The scoping of likely significant effects on Marine Sediment, Water Quality and WFD receptors within the Marine Sediment, Water Quality and WFD Study Area via the proposed Offshore Project, is outlined in Table 6.4-6.




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Table 6.4-6 EIA Scoping Assessment for Marine Sediment, Water Quality and WFD


Potential Impact	Scoping Result	Justification	Assessment Method
Construction and Decommissioning			
Deterioration in water and sediment quality due to accidental spill/release of pollutants from vessels, including within WFD designated water bodies with associated quality elements receptors	Out	The presence of vessels and plant machinery operating during construction and decommissioning introduces the risk of accidental release of pollutants from leaks or spills of fuels and lubricants. However, a CEMP that complies with requirements and best practices in accordance with MARPOL and Shipboard Oil Pollution Emergency Plans (SOPEPs), will reduce the likelihood and minimise the impact of any accidental spill/release of pollutants from construction vessels and equipment on receptors. Additionally, the magnitude of an accidental spill/release will be limited by the limited quantity of potentially polluting substances present on construction vessels. Therefore, this impact has been scoped out of the Offshore EIAR.	N/A
Deterioration in water quality due to accidental release of sewage and domestic waste from vessels, including within WFD designated water bodies with associated quality elements receptors	Out	The presence of vessels in the area during construction and decommissioning poses the risk of increased inorganic and organic nutrients entering the water and sediments due to accidental release of sewage and domestic waste from vessels. Nutrient enrichment of the water column can lead to a potential increase of eutrophication events. Compliance with requirements and best practices stated in a CEMP and compliance with MARPOL will reduce the likelihood and minimise the impact of any accidental release of waste material from vessels. Additionally, the magnitude of an accidental spill/release will be limited by	N/A

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Potential Impact	Scoping Result	Justification	Assessment Method
		the relatively small quantity of waste present on construction vessels. Therefore, this impact has been scoped out of the Offshore EIAR.	
Deterioration in water and sediment quality due to accidental release and loss of debris, materials, and/or litter from vessels, including within WFD designated water bodies with associated quality elements receptors	Out	The presence of vessels in the area during construction and decommissioning poses the risk of accidental release of solid material, litter and debris present onboard (e.g. construction/decommissioned engineering waste). This could potentially lead to seabed habitat deterioration and water column contamination e.g. plastics remain suspended, causing litter accumulation, chemical leaching (pollution) and physical damage to biology through ingestion, toxic bioaccumulation, smothering. Compliance with requirements and best practices stated in a CEMP and compliance with MARPOL will reduce the likelihood and minimise the impact of any accidental release of solid material, litter and debris present onboard. Additionally, the magnitude of an accidental spill/release will be limited by the limited inventory of material present on construction vessels. Therefore, this impact has been scoped out of the EIA report.	N/A
Deterioration in water and sediment quality due to remobilisation of sediments causing potential resuspension of contaminated	In	Direct seabed disturbance during construction (substrate preparation and installation of infrastructure), releases potentially contaminated sediments into the water column which are subsequently transported and dispersed in suspension by currents and deposited over various distances and directions (tidal advection and sediment granulometry dependent). The remobilisation	The assessment will be informed by the environmental baseline survey and the spreadsheet-based tools for extent and

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Potential Impact	Scoping Result	Justification	Assessment Method
sediments and radioactive particles into the water column, including within WFD designated water bodies with associated quality elements receptors		of contaminated sediments can lead to deterioration of the water quality as a receptor, and as a pathway can negatively impact the health of benthos, plankton and nekton. Sediment quality baseline data, the timing and scale of direct seabed disturbance associated with construction and decommissioning will determine the significance of this impact, therefore, this impact has been scoped in for further consideration within the Offshore EIAR.	concentration of any sediment plumes (as described in Chapter 6.1: Physical and Coastal Processes).
Deterioration in water quality due to remobilisation of sediments causing increased suspended solids concentration in the water column, including within WFD designated water bodies with associated quality elements receptors	In	Direct seabed disturbance during construction (substrate preparation (if required) and installation of infrastructure), temporarily increases suspended sediments in the water column, which are then transported and dispersed in suspension by currents and deposited over various distances (tidal advection and sediment granulometry dependent). Prolonged increased SSC can lead to deterioration of the water quality as a receptor, and as a pathway can negatively impact biological receptors as it may lead to smothering and decreased water clarity. The timing and scale of direct seabed habitat disturbance associated with construction and decommissioning will determine the significance of this impact, therefore, this impact has been scoped in for further consideration within the Offshore EIAR.	The assessment will be informed by the environmental baseline survey and the spreadsheet-based tools for extent and concentration of any sediment plumes (as described in Chapter 6.1: Physical and Coastal Processes).
Deterioration in water and sediment quality due to	In	To transition the offshore export cable from the marine environmental to the landfall location, trenchless techniques such as HDD will potentially be	The assessment will be informed by the

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Potential Impact	Scoping Result	Justification	Assessment Method
release of drilling fluid, drilling arisings, or bentonite, including within WFD designated water bodies with associated quality elements receptors		employed. This activity can lead to the release of drilling fluids, which increases fine sediment suspension and depending on the drilling fluid used may release very low levels of bentonite into the water column, which may impact the water and sediment quality receptors, and as pathways can negatively impact biological receptors. The magnitude of the impact and the sensitivity of the receptors will determine its significance therefore, this impact has been scoped in for further consideration within the Offshore EIAR.	environmental baseline survey and the spreadsheet-based tools for extent and concentration of any sediment plumes (as described in Chapter 6.1: Physical and Coastal Processes).
Operation and Maintenance			
Deterioration in water and sediment quality due to accidental spill/release of pollutants from vessels, including within WFD designated water bodies with associated quality elements receptors	Out	The presence of vessels and plant machinery operating during maintenance introduces the risk of accidental release of pollutants from leaks or spills of fuels and lubricants. However, an environmental management plan (e.g. a PEMP), which complies with requirements and best practices in accordance with MARPOL and SOPEPs, will reduce the likelihood and minimise the impact of any accidental spill/release of pollutants from maintenance vessels and equipment. Additionally, the number of trips will be limited when compared to the construction phase. Impact magnitude of an accidental spill/release will be further limited by the substances limited inventory on board of the vessels. Therefore, this impact has been scoped out of the Offshore EIAR.	N/A

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Potential Impact	Scoping Result	Justification	Assessment Method
Deterioration in water quality due to accidental release of sewage and domestic waste from vessels, including within WFD designated water bodies with associated quality elements receptors	Out	The presence of vessels in the area during maintenance activities poses the risk of increased inorganic and organic nutrients present in water and sediments due to accidental release of sewage and domestic waste from vessels during maintenance events. Nutrient enrichment of the water column can lead to a potential increase of eutrophication events. Compliance with requirements and best practices stated in a PEMP and compliance with MARPOL, will reduce the likelihood and minimise the impact of any accidental release of waste material from vessels. Additionally, the number of trips will be limited when compared to the construction phase. Impact magnitude of an accidental spill/release will be further limited by the substances limited inventory on board of the vessels. Therefore, this impact has been scoped out of the Offshore EIAR.	N/A
Deterioration in water and sediment quality due to accidental release and loss of debris, materials, and/or litter from vessels, including within WFD designated water bodies with associated quality elements receptors	Out	The presence of vessels in the area during maintenance activities poses the risk of accidental release of solid material, litter and debris present onboard (e.g. maintenance engineering waste). This could potentially lead to seabed habitat deterioration and water column contamination e.g. plastics remain suspended, causing litter accumulation, chemical leaching (pollution) and physical damage to biology through ingestion, toxic bioaccumulation, smothering. Compliance with requirements and best practices stated in a PEMP and compliance with MARPOL, will reduce the likelihood and minimise the impact of any accidental release of waste material from	N/A

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Potential Impact	Scoping Result	Justification	Assessment Method
		vessels. Additionally, the number of trips will be limited when compared to the construction phase. Impact magnitude of an accidental release will be further limited by the limited inventory on board of the vessels. Therefore, this impact has been scoped out of the Offshore EIAR.	
Deterioration in water and sediment quality due to remobilisation of sediments causing potential resuspension of contaminated sediments and radioactive particles into the water column, including within WFD designated water bodies with associated quality elements receptors	In	Direct seabed disturbance due to anchor chains sweeping the seabed and during maintenance may temporarily increase suspended sediment into the water column which are transported and dispersed in suspension by currents and deposited over various distances (tidal advection and sediment granulometry dependent). The remobilisation of contaminated sediments, especially in the FEPA order zone, can lead to deterioration of the water quality as a receptor, and as a pathway can negatively impact the health of benthos, plankton and nekton. Sediment quality baseline data, the timing and scale of direct seabed disturbance associated with maintenance and operation will determine the significance of this impact, therefore, this impact has been scoped in for further consideration within the Offshore EIAR.	The assessment will be informed by the environmental baseline survey and the spreadsheet-based tools for extent and concentration of any sediment plumes (as described in Chapter 6.1: Physical and Coastal Processes).
Deterioration in water quality due to remobilisation of sediments causing increased suspended solids concentration in the water	In	Direct seabed disturbance during operation and maintenance activities temporarily increases suspended sediment into the water column which are transported and dispersed in suspension by currents and deposited over various distances (tidal advection and sediment granulometry dependent). Mooring chains will drag along the seabed increasing SSC. Prolonged	The assessment will be informed by the environmental baseline survey and the spreadsheet-based tools for extent and

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Potential Impact	Scoping Result	Justification	Assessment Method
column, including within WFD designated water bodies with associated quality elements receptors		increased SSC can lead to deterioration of the water quality as a receptor, and as a pathway can negatively impact biological receptors as it may lead to smothering and decreased water clarity. Therefore, this impact has been scoped in for further consideration within the Offshore EIAR.	concentration of any sediment plumes (as described in Chapter 6.1: Physical and Coastal Processes).
Deterioration in water and sediment quality due to changes in sediment transport system and scouring, leading to alterations in physical processes, including within WFD designated water bodies with associated quality elements receptors	Out	The presence of seabed infrastructure during the operational phase can lead to scour and localised changes in sediment siltation rates. Scouring and changes in sediment transport can increase the amount of suspended particles in the water, affecting water clarity (deterioration of water quality receptor and pathway to biological receptors). Altered sediment transport can lead to increased erosion in some areas and excessive deposition in others, affecting sediment physical properties (receptor), and in turn as a pathway affect benthic receptors through habitat degradation. Floating turbines are anchored using mooring lines and anchors that are spread out over a larger area when compared to fixed based turbines. This system distributes the forces more evenly and reduces the seabed disturbance that typically causes scouring. Only very localised effects (around the mooring lines) are predicted to occur as a result of seabed dynamics disturbance. Therefore, this impact has been scoped out of the Offshore EIAR.	N/A
Deterioration in water and sediment quality due to	In	The presence of infrastructure in the water column during the operational phase can lead to long-term changes in water flow dynamics through	N/A

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Potential Impact	Scoping Result	Justification	Assessment Method
changes in waves and current regime (turbulence), caused by the presence of turbines potentially impacting physical processes, including within WFD designated water bodies with associated quality elements receptors		modification of the wind fields and oceanographic parameters including turbulence, mixing, and vertical stratification. The changes could in turn affect elements of the water quality receptor (e.g. nutrients and DO distribution), and as a pathway can negatively impact biological receptors. Although the Array Area is located within a high energy environment characterised by strong tidal wave mixing, enhancing the receptors recoverability, the impact magnitude cannot currently be determined. Therefore, this impact has been scoped in for further consideration within the Offshore EIAR.	
Deterioration in water and sediment quality due to increased seabed substrate and water column temperature from subsea cable operation, including within WFD designated water bodies with associated quality elements receptors	Out	The presence of high voltage cables in and around the seabed and the water column could lead to increased temperature in the areas immediately adjacent to the cables. This heat can increase the temperature of the seabed substrate, potentially affecting benthic organisms. Additionally, the heat emitted from subsea cables could create thermal plumes in the water column, potentially affecting water quality (decrease DO levels, etc.) and in turn, as pathway, affect marine life. The specification of subsea cable selected, and the depth of burial of cables on the seabed will determine the scale of substrate temperature elevation. Based on the evidence collected and assessed as part of other UK OWF projects, any elevation in substrate or water column temperature associated with subsea cables is likely to be a negligible change from baseline conditions and is not expected to impact	N/A

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Potential Impact	Scoping Result	Justification	Assessment Method
		receptors on or within the seabed substrate or within the water column. Therefore, this impact has been scoped out of the Offshore EIAR.	
All Phases			
Deterioration of designated bathing waters status	In	Two designated bathing waters are located within the Offshore Cable Corridor Area of Search. Direct and indirect environmental disturbance during Offshore Project construction, maintenance and decommissioning activities (e.g. effects caused by the presence of vessels or construction activities at landfall) can lead to the deterioration of bathing waters classification. Therefore, this impact has been scoped in for detailed assessment in the EIA report. This will be reviewed upon finalisation of the PDE and cable corridors' final location.	The assessment will be informed through a final stage 2 WFD compliance assessment for Offshore Project-specific activities.
Deterioration of designated shellfish waters status	Out	Designated shellfish waters are >2 km from the Offshore Project. Therefore, shellfish waters are beyond the assessment criteria set by the WFD and detailed assessment is ruled out. This impact has been scoped out of the EIA report.	N/A

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6.4.6. PROPOSED APPROACH TO EIA

6.4.6.1. Relevant Data Sources

Data sources listed within Table 6.4-7, alongside further secondary data sources including published and unpublished papers, journals and reports will be used to inform the EIA. These sources may be further supplemented by any additional material identified during stakeholder consultation.

A site-specific subtidal environmental survey will be undertaken to inform the baseline conditions for the site. An intertidal environmental survey may also be undertaken depending on the selected landfall location.

The subtidal environmental survey will include both drop-down video (DDV) and grab samples, where appropriate, (PSA, hydrocarbons, metals and macrofauna) within the Array Area and selected export cable corridor within the Offshore Cable Corridor Area of Search. A geophysical survey, that includes as a minimum Multibeam Echosounder (MBES), will be undertaken, should this geophysical data be available prior to the subtidal environmental survey commencing, the data will be used to identify target areas of interest to be sampled during the survey campaign.

If required, the intertidal environmental survey will likely consist of a walkover survey and, if necessary, surface sediment sampling. The survey approach will be refined in discussion with stakeholders once the preferred landfall location has been confirmed.

6.4.6.2. Consultation

Consultation and engagement will be key to confirm the methodology and approach to the assessment. Throughout the duration of the Offshore Project, collaboration between the Offshore Project team and external stakeholders will be established. Organisations that will be consulted with respect to this specific EIA topic, include:

- MD-LOT
- NatureScot
- SEPA
- JNCC
- Local councils: The Highland Council and Orkney Islands Council

6.4.6.3. Policy, Legislation and Guidance

The assessment of Marine Sediment, Water Quality and WFD will consider the legislation, policy and guidance listed below (Table 6.4-7).



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Table 6.4-7 Legislation, Policy and Guidance Relevant to the Marine Sediment, Water Quality and WFD Assessment

Relevant Legislation, Policy and Guidance
Legislation and Policy
Marine (Scotland) Act, 2010
Marine and Coastal Access Act, 2009
Environmental Assessment (Scotland) Act, 2005
Scotland's National Marine Plan, 2015
Sectoral Marine Plan (North)
Blue Economy Vision for Scotland
Habitats Regulations (Annex I features)
Water Environment and Water Services (Scotland) Act 2003 (WEWS)
Marine Strategy Framework Directive and Good Environmental Status
Water Framework Directive
River Basin Management Plan
EQS Directive
Bathing Waters Directive
Shellfish Waters Directive
Guidance
Cefas Action Levels
Canadian Sediment Quality Guidelines for the Protection of Aquatic Life
Dutch quality standards from the Dutch National Institute for Public Health and the Environment's (RIVM) (Hin et al. 2010)
Environment Agency coastal and transitional water bodies scoping template
Environmental Quality Standards
Guidance for Pollution Prevention (GPP) Note 5 (GPP5) – Works and maintenance in or near water produced by NRW, and Northern Ireland Environment Agency (NIEA) and SEPA (2018)
Marine Scotland Action Levels
OSPAR Assessment of the Environmental Impacts of Cables (OSPAR, 2009)
Regulation 37 of Annex I of MARPOL (requires that all ships of 400 GT or more carry an approved SOPEP)
Review of Cabling Techniques and Environmental Effects Applicable to the Offshore Wind Farm Industry (BERR, 2008)
Supporting Guidance (WAT-SG-53) Environmental Quality Standards and Standards for Discharges to Surface Waters

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6.4.6.4. Assessment Methodology

The assessment will follow the methodology described in Chapter 4: Proposed Approach to EIA. Further refinement of the methodology will be undertaken prior to the chapter being written as part of the baseline and stakeholder engagement. Cumulative and transboundary effects are also discussed in Chapter 4: Proposed Approach to EIA, and assessment of these will apply to Marine Sediment, Water Quality and WFD.

The main aim of the Marine Sediment, Water Quality and WFD assessment is to further understand and characterise the existing environment in the Marine Sediment, Water Quality and WFD Study Area. A greater understanding of the key receptors identified, including water quality, sediment quality and WFD designated water bodies and protected areas, will assist in providing a firm baseline for any potential effects of the Offshore Project.

Magnitude and duration of impact will be considered under the Marine Sediment, Water Quality and WFD assessment, alongside the reversibility of the impact and the timing and frequency of the activity. An assessment of the likely significant effects of the Offshore Project will be undertaken through application of the evidence base. An updated WFD compliance assessment Stage 2 and a detailed assessment Stage 3, if appropriate, will be carried out to determine compliance with the WFD and RBMP objectives.

Other receptors assessed in this Offshore Scoping Report, affected by Marine Sediment, Water Quality and WFD, include:


- Chapter 6.5: Benthic and Intertidal Ecology
- Chapter 6.6: Fish and Shellfish Ecology
- Chapter 6.7: Marine Mammals and Other Megafauna
- Chapter 6.10: Commercial Fisheries
- Chapter 6.13: Infrastructure, Other Sea Users, Tourism and Recreation

Stakeholder consultation will be undertaken at pivotal points throughout the EIA process to ensure that the approach, including the application of the evidence base, satisfies the requirements of both stakeholders and regulators, such as after scoping and at the draft production of the chapter during the Offshore EIAR.

6.4.7. SCOPING QUESTIONS FOR CONSULTEES

Scoping questions for consultees in relation to the Marine Sediment, Water Quality and WFD Assessment include:

1. Do you agree with the proposed Marine Sediment, Water Quality and WFD Study Area?
2. Do you agree that the data sources referenced above to inform the baseline are valid and sufficient for the purposes of this scoping assessment?

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3. Have all Marine Sediment, Water Quality and WFD receptors and potential impacts that could result from the Offshore Project been identified?
4. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts for Marine Sediment, Water Quality and WFD?
5. Do you agree that the designed in mitigation measures described provide a suitable means for managing and mitigating the relevant potential effects of the Offshore Project on Marine Sediment, Water Quality and WFD receptors?

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6.5. BENTHIC AND INTERTIDAL ECOLOGY

6.5.1. INTRODUCTION

This chapter of the Offshore Scoping Report provides an overview of the baseline environment for Benthic and Intertidal Ecology within the Array Area and Offshore Cable Corridor Area of Search. It also includes a scoping assessment of likely significant effects for the relevant receptors, from the construction, operation (including maintenance), and decommissioning phases of the Offshore Project.

6.5.2. STUDY AREA

The Benthic and Intertidal Ecology Study Area has been defined as the Array Area and Offshore Cable Corridor Area of Search up to the MHWS. The scoping design envelope extends to MHWS meaning impacts from offshore infrastructure are considered for receptors below MHWS. It should be noted that the topic-specific study area will vary depending on the nature and scale of each receptor, or associated pathway, that could result in a receptor effect.

As highlighted in Figure 6.5-1, the Benthic and Intertidal Ecology Study Area comprises the Array Area and Offshore Cable Corridor Area of Search. There is expected to be a wider zone of influence around the Array Area and Offshore Cable Corridor Area of Search, this zone will be defined as the Wider Study Area and its extent will be determined by the coastal processes study at the EIA stage. For the purpose of the Offshore Scoping Report the baseline environment within the Array Area and Offshore Cable Corridor Area have been considered.

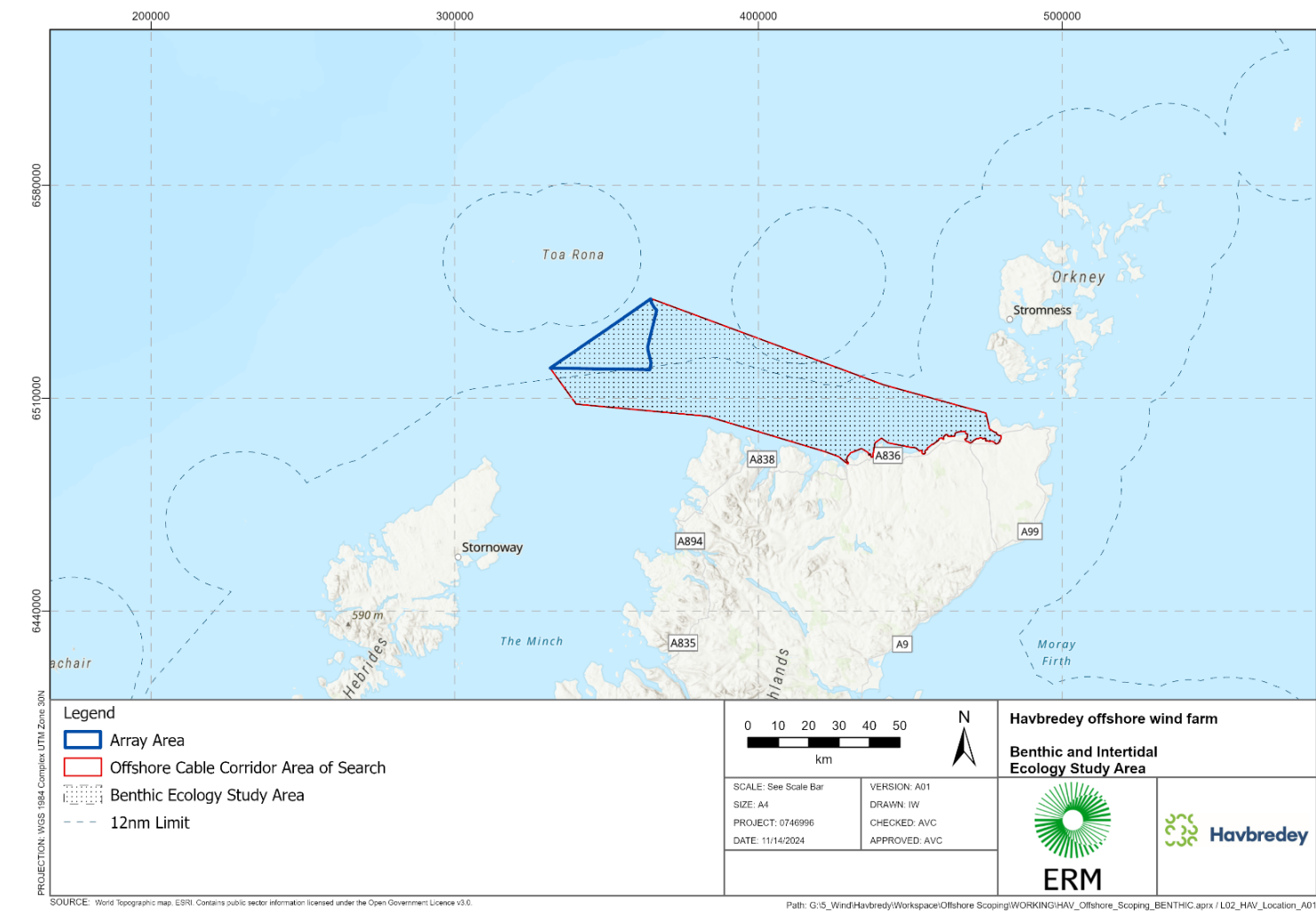



Figure 6.5-1 Benthic and Intertidal Ecology Study Area

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6.5.3. BASELINE ENVIRONMENT

6.5.3.1. Data Sources

Data sources used to inform this Benthic and Intertidal Ecology Chapter of the Offshore Scoping Report are presented in Table 6.5-1.

Table 6.5-1 Summary of Key Data Sources for Benthic and Intertidal Ecology

Source	Spatial Coverage	Year	Summary
Annex I Reefs in UK Waters (OpenData), JNCC	Partial coverage of Benthic and Intertidal Ecology Study Area	2021	Known locations of Annex I Reefs
Annex I Sandbanks in the UK – Public Polygons, JNCC	Partial coverage of Benthic and Intertidal Ecology Study Area	2019	Known locations of Annex I Subtidal Sandbanks
European Marine Observation and Data Network (EMODnet) - EMODnet broad-scale seabed habitat map for Europe (EUSeaMap)	Full coverage of Benthic and Intertidal Ecology Study Area	2023	Modelled distribution of EUNIS biotopes
EMODnet - OSPAR threatened and/or declining habitats	Partial coverage of Benthic and Intertidal Ecology Study Area	2020	Known locations of OSPAR threatened and/or declining habitats
Geodatabase of Marine features adjacent to Scotland (GeMs) - Scottish Priority Marine Features (PMF)	Partial coverage of Benthic and Intertidal Ecology Study Area	2022	Known locations of PMF
MPA Mapper, JNCC	Full Coverage of Benthic and Intertidal Ecology Study Area	2024	Locations of MPAs
Marine Scotland National Marine Plan Interactive	Full Coverage of Benthic and	2024	Online mapper with environmental geospatial data for Scottish seas

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Source	Spatial Coverage	Year	Summary
(NMPi) Maps, Marine Scotland	Intertidal Ecology Study Area		
OneBenthic	Patial coverage of Benthic and Intertidal Ecology Study Area	2023	Macrofauna and PSA data from grab samples
Pentland FLOW EIAR	Partial coverage of Benthic and Intertidal Ecology Study Area	2022	Description of benthic habitats within the Pentland Offshore Wind Farm array area and export cable corridor
West of Orkney Windfarm Offshore EIAR	Partial coverage of Benthic and Intertidal Ecology Study Area	2023	Description of benthic habitats within the West of Orkney Windfarm array area and export cable corridor


6.5.3.2. Site-Specific Surveys

In order to provide site-specific and up to date information on which to base the impact assessment, a site-specific subtidal environmental survey will be undertaken to inform the baseline conditions for the site. An intertidal environmental survey may also be undertaken depending on the selected landfall location.

The subtidal environmental survey will include both DDV and grab samples (PSA, hydrocarbons, metals and macrofauna) within the Array Area and selected export cable corridor within the Offshore Cable Corridor Area of Search. A geophysical survey, that includes as a minimum MBES, will be undertaken in addition to the subtidal environmental survey and the data from this survey will be used by the Offshore Project to further define the baseline. Should this geophysical data be available prior to the subtidal environmental survey commencing, the data will be used to identify target areas of interest to be sampled during the survey campaign.

If required, the intertidal environmental survey will likely consist of a walkover survey and, if necessary, surface sediment sampling. The survey approach will be refined in discussion with stakeholders once the preferred landfall location has been confirmed.

MD, NatureScot and other relevant stakeholders will be consulted with on the final survey scopes prior to commencement of the surveys for the Offshore Project.

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6.5.3.3. Overview of the Baseline Environment

Supporting this Offshore Scoping Report, an initial desk-based review of literature and available data sources (see Table 6.5-1) has been undertaken; the findings are presented below and provide an understanding of the baseline environment for Benthic and Intertidal Ecology.

Intertidal Benthic Ecology


The coastline between Bettyhill and Dunnet is characterised largely by a rugged rocky coastline, with sandy beaches only forming in the sheltered bays along the coast (Google Earth, 2024). As such, the intertidal area between Bettyhill and Dunnet is expected to be characterised by MA1 Littoral rock, MA3 Littoral coarse sediment and MB5 Littoral sand. An intertidal survey conducted along the north Caithness coast for West of Orkney Offshore Wind Farm (OWF), overlapping the Offshore Cable Corridor Area of Search, characterised the intertidal area as high energy rock (MA1) supporting a variety of marine invertebrates, fucoids and seaweed (Xodus Group Ltd, 2023). Soft sediments consisting mostly of coarse sediment, gravel and shingle, were found limited to the most sheltered areas. Another intertidal survey conducted within the Offshore Cable Corridor Area of Search (between Sandside Bay and Dounreay) identified a total of nine biotopes associated with the rocky habitat present, these were (Fox, 2015):

- MA1241: *Pelvetia canaliculata* and barnacles on moderately exposed littoral fringe rock
- MA1223: *Semibalanus balanoides* on exposed to moderately exposed or vertical sheltered eulittoral rock
- MA1242: *Fucus spiralis* on full salinity exposed to moderately exposed upper eulittoral rock
- MA1263: Fucoids and kelp in deep eulittoral rockpools
- MA1261: Green seaweeds (*Enteromorpha* spp. and *Cladophora* spp.) in shallow upper shore rockpools
- MA1262: Coralline crust-dominated shallow eulittoral rockpools
- MA121: Lichens or small green algae on supralittoral and littoral fringe rock
- MA12442: *Fucus serratus* and under-boulder fauna on lower eulittoral boulders
- MB1217: *Laminaria digitata* on moderately exposed sublittoral fringe rock

Subtidal Benthic Ecology

Broad-scale habitat (BSH) benthic data was sourced from EUSeaMap (EMODnet, 2024) with spatial mapping of level 3 to 4 classified habitats. Figure 6.5-2 shows the spatial distribution of the BSH within the Benthic and Intertidal Ecology Study Area and wider region. The BSH MD32 'Atlantic offshore circalittoral coarse sediment' dominates the Array Area with areas of MD52 'Atlantic offshore circalittoral sand' present within the southwest and northeast of the Array Area.

The BSH present within the Offshore Cable Corridor Area of Search is more varied:

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- MB12: Atlantic infralittoral rock
- MB32: Atlantic infralittoral coarse sediment
- MB52: Atlantic infralittoral sand
- MC12: Atlantic circalittoral rock
- MC32: Atlantic circalittoral coarse sediment
- MC52: Atlantic circalittoral sand
- MD12: Atlantic offshore circalittoral rock
- MD32: Atlantic offshore circalittoral coarse sediment
- MD52: Atlantic offshore circalittoral sand

A subtidal survey for Pentland FLOW, overlapping with the Offshore Cable Area of Search, recorded a predominance of A5.252 '*Abra prismatica*, *Bathyporeia elegans*, and polychaetes in circalittoral fine sand and A5.27 'Deep circalittoral sand' (Xodus Group Ltd, 2022). Additional, biotopes recorded offshore were:

- MC121: Faunal turf communities on Atlantic circalittoral rock
- MC321: Faunal communities of Atlantic circalittoral coarse sediment
- MD321: Faunal communities of Atlantic offshore circalittoral coarse sediment
- MC421: Faunal communities of Atlantic circalittoral mixed sediment
- MD4211: Polychaete-rich deep venus community in Atlantic offshore mixed sediments
- MC521: Faunal communities of Atlantic circalittoral sand

The nearshore was characterised by MB1215 '*Laminaria hyperborea* with dense foliose red seaweeds on exposed Atlantic infralittoral rock' and MB1235 'Mixed kelps beds with scour-tolerant and opportunistic foliose red seaweeds on scoured or sand-covered Atlantic infralittoral rock'.

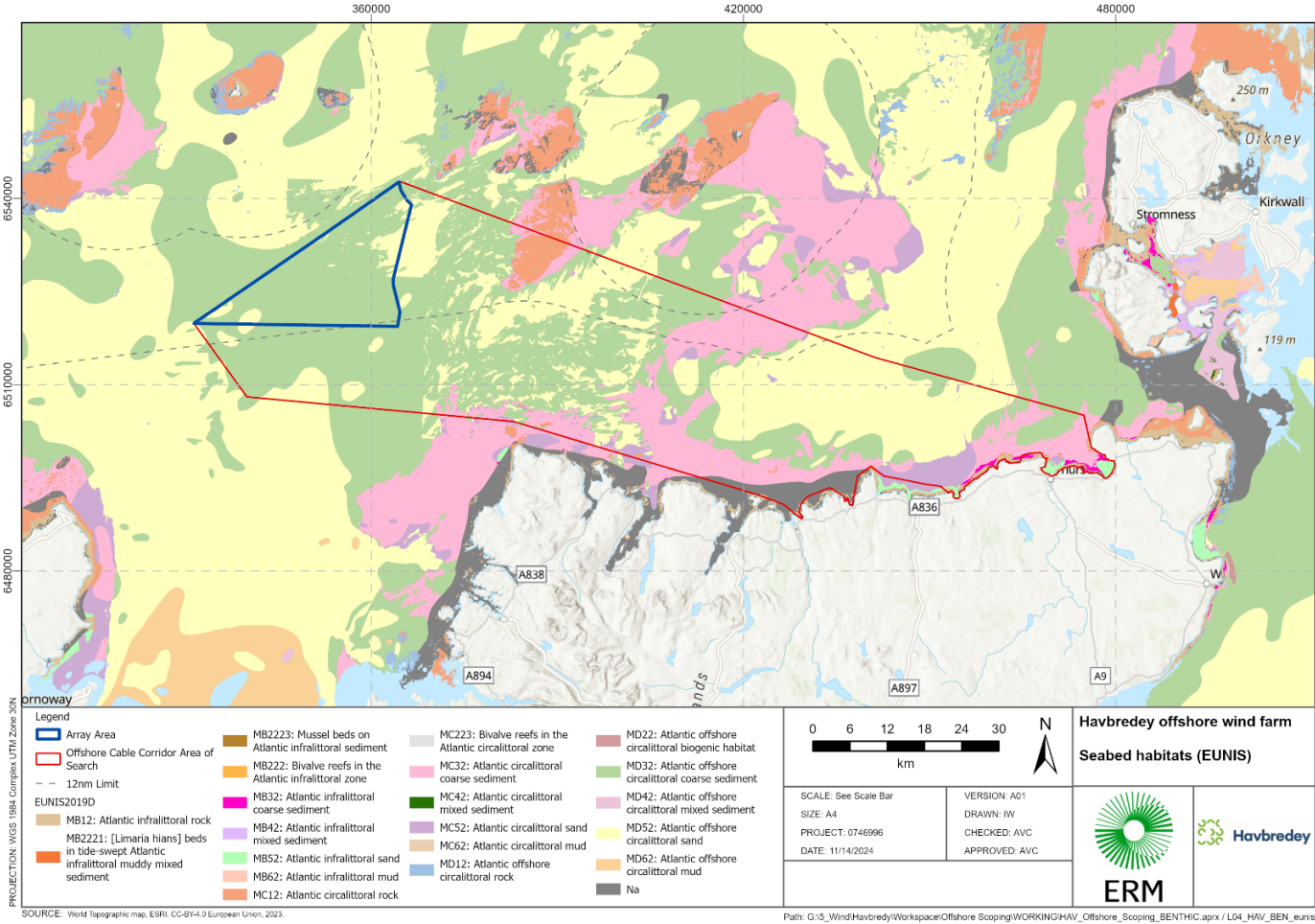



Figure 6.5-2 EUNIS Biotopes Present Within and Around the Array Area and Offshore Cable Corridor Area of Search

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Features of Conservation Interest

Intertidal

Based on available information, the Offshore Cable Corridor Area of Search may overlap with areas of Annex I rocky reef habitat (Xodus Group Ltd, 2022) (Figure 6.5-3). During an intertidal survey at Dounreay in 2015, the OSPAR convention listed species the dog whelk *Nucella lapillus* was found on most of the surveyed intertidal rock (Fox, 2015). As the Offshore Cable Corridor Area of Search overlaps the Dounreay intertidal survey area, it is likely to overlap areas where dog whelk is present.

As illustrated in Figure 6.5-3, the Offshore Cable Corridor Area of Search also overlaps two potential areas of Annex I sandflats and mudflats not covered by seawater at low tide.


Subtidal

Based on available information, the Array Area does not overlap any features of conservation interest apart from the PMF Offshore subtidal sands and gravels (Figure 6.5-3). This PMF is widespread in offshore waters and is one of the most common habitats in the UK offshore marine environment (Tyler-Walters *et al.* 2016).

PMF Kelp bed records have been identified within the shallow waters of the Offshore Cable Corridor Area of Search, overlapping with potential Annex I bedrock reef which hugs most of the coastline between Bettyhill and Dunnet (Figure 6.5-3). The Offshore Cable Corridor Area of Search also overlaps the PMF Subtidal sands and gravels. A recent survey by MMT for Pentland FLOW confirmed the presence of both PMF Kelp beds and Annex I Reefs (subtype 'Stony Reef' and 'Bedrock Reefs') near Dounreay, which overlaps the Offshore Cable Corridor Area of Search (Xodus Group Ltd, 2022). Annex I Reefs were also recorded in a survey by Ocean Infinity for West of Orkney Windfarm, located west of Thurso, which overlaps the Offshore Cable Corridor Area of Search (Xodus Group Ltd, 2023). Both the Ocean Infinity and MMT surveys also recorded individuals of ocean quahog *Arctica islandica*, a PMF species and OSPAR threatened and/or declining species.

The Solan Bank Reef SAC is located approximately 5 km east of the Array Area and is overlapped by the Offshore Cable Corridor Area of Search (Figure 6.5-3). This SAC is designated for the protection of Annex I reef (bedrock and stony reef). The reef is home to a variety of encrusting bryozoans and coralline algae, brittlestars, cup corals, jewel anemones, red algae and rare sponges (JNCC, 2024).

INNS have been recorded within and in close proximity to the Benthic and Intertidal Ecology Study Area. The orange ripple bryozoan *Schizoporella japonica* and the orange-tipped sea squirt *Corella eumyota* have been recorded near Thurso (NBN atlas, 2024b), within the Benthic and Intertidal Ecology Study Area. Furthermore, the macroalgal *Sargassum muticum*, the green algae *Codium fragile* subsp. fragile and the

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Pacific oyster *Magallana gigas* have also been recorded in the north of Scotland in the Orkney Islands archipelago (Want *et al.* 2023; NBN atlas, 2024c).

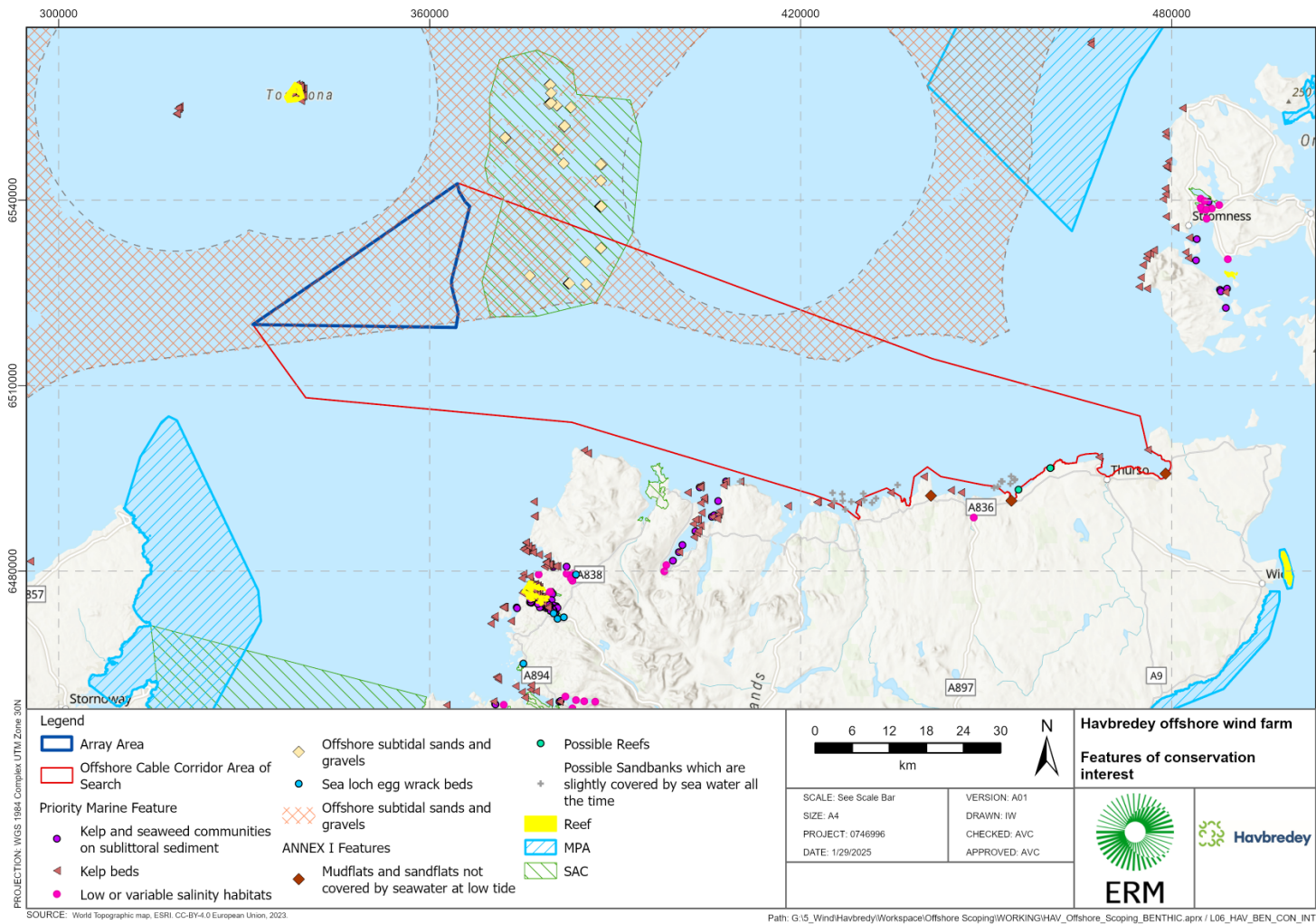



Figure 6.5-3 Features of Conservation Interest Within and Around the Array Area and Offshore Cable Corridor Area of Search


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6.5.4. DESIGNED IN MITIGATION

The designed in mitigation relevant to the Benthic and Intertidal Ecology assessment, which have been incorporated into the current design of the Offshore Project, is outlined below in Table 6.5-2.

Table 6.5-2 Benthic and Intertidal Ecology Designed In Mitigation Measures

ID	Designed in Measure	How the measure will be secured
ID001	The outputs of the site-specific geophysical and environmental surveys will be reviewed as part of a Layout Plan to ensure that the final design and location of key Offshore Project infrastructure takes full account of the physical and benthic environments. Any sensitive areas identified will be avoided, as far as is possible, by micro-siting WTGs and cables.	Secured under Section 36 and/or Marine Licence consent conditions.
ID003	A CEMP and PEMP will be developed prior to construction and adhered to in compliance with legislative requirements and best practice standards and guidance.	Secured under Section 36 and/or Marine Licence consent conditions.
ID006	The Project will adhere to requirements of relevant international conventions, including MARPOL 73/78.	Secured under Section 36 and/or Marine Licence consent conditions.
ID007	Best practice techniques will be employed through all phases of the Project, and measures will be provided in a Marine Pollution Contingency Plan (MPCP), which will form part of the CEMP and PEMP. SOPEPs will be developed for the Project prior to construction.	Secured under Section 36 and/or Marine Licence consent conditions.
ID009	Compliance with the International Convention for the Control and Management of Ship's Ballast Water and Sediments and adherence to INNS Management Plan to reduce the risk of introducing or spreading invasive species.	Secured under Section 36 and/or Marine Licence consent conditions.
ID010	Pre-consent characterisation studies will inform the presence and location of sensitive species and habitats, which will inform the optimal placement of infrastructure to minimise disturbance to these habitats, where feasible,	The location of offshore infrastructure outlined as part of the Section 36 and the Marine Licence application.

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ID	Designed in Measure	How the measure will be secured
	and minimise long-term changes in physical processes and minimise disturbance of contaminated sediments.	
ID011	Cables located on the seabed will be buried where needed as per CBRA studies.	Secured under Section 36 and/or Marine Licence consent conditions.

6.5.5. SUMMARY OF KEY RECEPTORS, SENSITIVITIES AND LIKELY SIGNIFICANT EFFECTS

The key receptors for Benthic and Intertidal Ecology will be defined in the EIA, following site-specific surveys.

6.5.5.1. Likely Significant Effects

The scoping of likely significant effects on Benthic and Intertidal Ecology receptors which may arise within the Benthic and Intertidal Ecology Study Area via the proposed Offshore Project, is outlined in Table 6.5-3.




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Table 6.5-3 EIA Scoping Assessment for Benthic and Intertidal Ecology


Potential Impact	Scoping Result	Justification	Assessment Method
Construction and Decommissioning			
Temporary habitat disturbance	In	Physical disturbance to habitats during installation of infrastructure (anchor placement and cable burial) and decommissioning through removal of infrastructure. This disturbance may alter the local habitat for supporting species, which can reduce habitat suitability and resources resulting in displacement of fauna to alternative areas.	PDE will inform the area of temporary disturbance while survey-specific information will determine the receptors that will be impacted. Receptor sensitivities will draw from Feature Activity Sensitivity Tool (FeAST) and Marine Evidence based Sensitivity Assessment (MarESA).
Temporary increase in SSC, turbidity and siltation	In	Disturbance of the seabed arising from construction activities (such as cable laying and anchor placement) and decommissioning (infrastructure removal) may result in adverse effects on benthic communities from increased SSC. This will increase water column turbidity and result in increased siltation and smothering of sessile fauna and/or clogging of their feeding apparatus.	A coastal process study will determine the extent and magnitude of the impact. With the known extent, site-specific data and publicly available data will determine the receptors that are likely to be impacted. Receptor sensitivities will draw from FeAST and MarESA.
Accidental release of pollutants from vessels and plant machinery	Out	Accidental pollutant spills from equipment associated with construction and decommissioning may negatively impact benthic and intertidal receptors; however, an environmental monitoring plan (e.g. a CEMP), which complies with requirements and best practices in	N/A

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Potential Impact	Scoping Result	Justification	Assessment Method
		accordance with MARPOL and SOPEPs, will reduce the likelihood and minimise the impact of any accidental release of pollutants from construction/decommissioning vessels and equipment. Therefore, this impact has been scoped out of the Offshore EIAR.	
Accidental release of contaminants through sediment disturbance	In	Works at the seabed (for both construction and decommissioning phases) will lead to sediment disturbance and has the potential to re-mobilise contaminated sediments into the environment. The Array Area and Offshore Cable Corridor Area of Search are located in an area of no oil and gas activity (North Sea Transition Authority (NSTA), 2024). There is one small open dredge spoil deposit site located close to Dunnet (Scottish Governments, 2024). However, chemical testing is performed prior to dredging and disposal to ensure sediment is not contaminated. As such the sediments are not expected to contain elevated levels of hydrocarbons, heavy metals or other contaminants. Between 1958 and 1984 discharge of particles and fragments of irradiated nuclear fuel occurred from Dounreay. The most hazardous fragments are located close to an old discharge point on the	Site-specific data will reveal the presence or absence of contaminated sediments in the Benthic and Intertidal Ecology Study Area and inform which receptors overlap with the impact. Receptor sensitivities will draw from FeAST and MarESA.

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Potential Impact	Scoping Result	Justification	Assessment Method
		<p>seabed. The disintegration of this hazardous waste is believed to be the source of less hazardous particles being detected on local beaches to date.</p> <p>Industry and ports are often large contributors to contamination in coastal waters. Within the Offshore Cable Area of Search there are 6 ports and harbours.</p> <p>Release of hazardous waste can have toxicity effects on benthic fauna (Long <i>et al.</i> 1995; Buchman, 2008). Based on the potential disturbance of hazardous waste this impact has been scoped into the Offshore EIAR.</p>	
Introduction and colonisation by INNS	In	<p>Increased vessel activity during construction and decommissioning phases will increase the potential risk of introduction of INNS into the area. INNS may be introduced through the release of ballast water within the vicinity of the Offshore Project during construction. However, industry best practice will be followed such as adherence with the International Convention for the Control and Management of Ship's Ballast Water and Sediments and adherence to a project specific INNS Management Plan to reduce the risk of introducing or</p>	The PDE, site-specific survey data and publicly available data will inform the risk of colonisation of INNS. Sensitivity will draw from FeAST and MarESA.

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Potential Impact	Scoping Result	Justification	Assessment Method
		spreading invasive species. On a precautionary basis this impact has been scoped in.	
Protection of benthic habitats from fishing restrictions	Out	Should there be a temporary, complete loss of, or restricted access to traditional fishing grounds impacts to benthic habitats will not occur from fishing activities that interact with the seabed. However, the Array Area and Offshore Cable Corridor Area of Search are located in an area subject to low fishing effort (Scottish Government, 2023) meaning that impacts to the seabed from fishing activities are limited within the Offshore Project. Cables located on the seabed will be buried where possible as per CBRA studies, reducing the risk to local fisheries active in the area (e.g. snagging risk). Considering this, the presence of project infrastructure is unlikely to afford protection to benthic habitats. As such, this impact has been scoped out of the Offshore EIAR.	N/A
Removal of habitat during decommissioning	In	Hard substrate introduced into the Benthic and Intertidal Ecology Study Area will become colonised by epifauna. The removal of project infrastructure during decommissioning would therefore remove the supporting habitats and associated communities. Removal of the substrate will result in localised decline in biodiversity.	The magnitude of impact will be informed by the PDE. Site-specific information will detail which receptors will be impacted and sensitivity of these features will draw from FeAST and MarESA.

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Potential Impact	Scoping Result	Justification	Assessment Method
Operation and Maintenance			
Temporary habitat disturbance	In	Physical disturbance to habitats during maintenance activities (cable repairs and/or remediation). This disturbance may alter the local habitat for supporting species, which can reduce habitat suitability and resources resulting in displacement of fauna to alternative areas.	PDE will inform the area of temporary disturbance while survey-specific data will inform the receptors that overlap with the impact. Receptor sensitivities will draw from FeAST and MarESA.
Temporary increase in SSC, turbidity and siltation	In	Disturbance of the seabed arising from maintenance activities (such as anchor placement) may result in adverse effects on benthic communities from increased SSC. This will increase water column turbidity and result in increased siltation and smothering of sessile fauna and/or clogging of their feeding apparatus.	A coastal process study will determine the extent and magnitude of the impact. With the known extent, site-specific data and publicly available data will determine the receptors that are likely to be impacted. Receptor sensitivities will draw from FeAST and MarESA.
Accidental release of pollutants from vessels and WTGs, and plant machinery	Out	Accidental pollutant spills from equipment associated with operation and maintenance may negatively impact benthic and intertidal receptors; however, an environmental monitoring plan (e.g. a CEMP), which complies with requirements and best practices in accordance with MARPOL and SOPEPs, will reduce the likelihood and minimise the impact of any accidental release of pollutants from construction/operation and	N/A

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Potential Impact	Scoping Result	Justification	Assessment Method
		<p>maintenance/decommissioning vessels and equipment. Therefore, this impact has been scoped out of the Offshore EIAR.</p>	
Accidental release of contaminants through sediment disturbance	In	<p>Operation and maintenance activities may lead to sediment disturbance and has the potential to re-mobilise contaminated sediments into the environment. The Array Area and Offshore Cable Corridor Area of Search are located in an area of no oil and gas activity (NSTA, 2024). There is one small open dredge spoil deposit site located close to Dunnet (Scottish Governments, 2024). However, chemical testing is performed prior to dredging and disposal to ensure sediment is not contaminated. As such the sediments are not expected to contain elevated levels of hydrocarbons, heavy metals or other contaminants. Between 1958 and 1984 discharge of particles and fragments of irradiated nuclear fuel occurred from Dounreay. The most hazardous fragments are located close to an old discharge point on the seabed. The disintegration of this hazardous waste is believed to be the source of less hazardous particles being detected on local beaches to date.</p>	<p>Site-specific data will reveal the presence or absence of contaminated sediments in the Benthic and Intertidal Ecology Study Area and inform which receptors overlap with the impact. Receptor sensitivities will draw from FeAST and MarESA.</p>

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Potential Impact	Scoping Result	Justification	Assessment Method
		<p>Industry and ports are often large contributors to contamination in coastal waters. Within the Offshore Cable Area of Search there are 6 ports and harbours.</p> <p>Release of hazardous waste can have toxicity effects on benthic fauna (Long <i>et al.</i> 1995; Buchman, 2008). Based on the potential disturbance of hazardous waste this impact has been scoped into the Offshore EIAR.</p>	
Introduction and colonisation of infrastructure by INNS	In	During the lifetime of the Offshore Project, there is the potential for long-term colonisation of hard structures (e.g., WTGs floating substructure) by INNS fauna, whereby these structures provide suitable artificial habitat for settlement. INNS taxa may outcompete and replace native fauna, altering a community's structure and functioning. INNS have a higher success in colonising a disturbed habitat or an uncolonised area such as newly introduced artificial structures (Wood <i>et al.</i> 2024; Katsanevakis <i>et al.</i> 2023).	The PDE, site-specific survey data and publicly available data will inform the risk of colonisation of INNS. Sensitivity will draw from FeAST and MarESA.
Colonisation of hard structures	In	Long-term placement of subsea infrastructure may provide suitable artificial substrate for native fauna. As a result, there may be localised increase in habitat complexity, offering an artificial reef effect. The potential balance between beneficial and adverse impacts of	Site-specific survey data will inform which receptors overlap with this impact. The project design envelop will inform the risk of the impact, while

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Potential Impact	Scoping Result	Justification	Assessment Method
		colonisation by native species of hard structures will primarily be considered.	receptor sensitivities will draw from FeAST and MarESA.
Protection of benthic habitats from fishing restrictions	Out	Should there be a temporary, complete loss of, or restricted access to traditional fishing grounds impacts to benthic habitats will not occur from fishing activities that interact with the seabed. However, the Array Area and Offshore Cable Corridor Area of Search are located in an area subject to low fishing effort (Scottish Government, 2023) meaning that impacts to the seabed from fishing activities are limited within the Offshore Project. Cables located on the seabed will be buried where possible as per CBRA studies, reducing the risk to local fisheries active in the area (e.g. snagging risk). Considering this, the presence of project infrastructure is unlikely to afford protection to benthic habitats. As such, this impact has been scoped out of the Offshore EIAR.	N/A
Long-term loss of habitat	In	The placement of subsea infrastructure (WTG anchors and mooring systems and/or scour and cable protection) will result in the long-term temporary loss of available benthic habitats.	The PDE will inform the area of long-term loss while survey-specific information will determine the receptors that overlap with the impact. Sensitivity of receptors will draw from FeAST and MarESA.

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Potential Impact	Scoping Result	Justification	Assessment Method
Long-term changes in physical processes	In	The long-term placement of subsea structures on the seabed (e.g., WTG anchors and mooring systems and scour protection) may result in changes in seabed morphology and tidal currents, causing localised scouring in these areas. Scour can result in localised loss of sediment, which can physically alter habitats and in turn affect benthic communities. Much of the Benthic and Intertidal Ecology Study Area is comprised of coarse-grained sediment, which is less likely to become resuspended and swept away. Furthermore, scour protection and cable protection (where burial is not possible) will be employed to reduce the risk of scouring. However, with current lack of site-specific data, this impact has been scoped in.	The assessment will be informed by the PDE and site-specific data. Sensitivity of receptors will draw from FeAST and MarESA.
Electromagnetic fields (EMF) and heat emissions from subsea electrical cables	In	<p>Electrical cables from OWF's can emit EMF into the marine environment. For benthic organisms, EMF may trigger development, physiological, and behavioural responses in sensitive species.</p> <p>Although the magnitude of EMF is expected to be reduced through seabed burial where possible, and naturally with horizontal and vertical distance, there may remain a potential localised pathway for an impact on</p>	A desk-based baseline review of existing literature specific to EMF effects on benthic receptors, alongside the PDE will be used to inform the assessment.

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Potential Impact	Scoping Result	Justification	Assessment Method
		<p>benthic fauna. Furthermore, there will be a section of the dynamic cable that will be close to the seabed. These sections will have limited cable protection.</p> <p>Water and substrate temperature increase from cables is likely to be a negligible change from baseline conditions. Therefore, temperature effects from cables will not be considered further.</p>	

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6.5.6. PROPOSED APPROACH TO EIA

6.5.6.1. Relevant Data Sources

Data sources listed within Table 6.5-1, alongside further secondary data sources including published and unpublished papers, journals and reports will be used to inform the EIA. These sources may be further supplemented by any additional material identified during stakeholder consultation.

Site-specific surveys will also supplement the desk-based sources, where available. Data from these surveys will enable the Benthic and Intertidal Ecology Study Area to be characterised for EIA purposes and will also inform the assessment.

6.5.6.2. Consultation

Consultation and engagement will be key to confirm the methodology and approach to the assessment. Throughout the duration of the Offshore Project, collaboration between the Offshore Project team and external stakeholders will be established. Organisations that will be consulted with respect to this specific EIA topic, include:


- NatureScot
- MD-LOT
- SWT
- SEPA
- The Highland Council

6.5.6.3. Policy, Legislation and Guidance

The assessment of Benthic and Intertidal Ecology will consider the legislation, policy and guidance listed below (Table 6.5-4).

Table 6.5-4 Legislation, Policy and Guidance Relevant to the Benthic and Intertidal Ecology Assessment

Relevant Legislation, Policy and Guidance
Legislation and Policy
Marine Scotland Act, 2010
Marine and Coastal Access Act, 2009
Environmental Assessment (Scotland) Act, 2009
Scotland's National Marine Plan, 2015
Sectoral Marine Plan (North)
The Scottish Government Strategy for Marine Nature Conservation
Scottish Biodiversity Strategy
Blue Economy Vision

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Relevant Legislation, Policy and Guidance
Habitats Regulations (Annex I features)
OSPAR List of Threatened and/or Declining Species and Habitats (OSPAR Agreement 2008-06)
Marine Strategy Framework Directive and Good Environmental Status
Guidance
Scottish National Heritage (SNH) - Guidance on Survey and Monitoring in Relation to Marine Renewables Deployments in Scotland Volume: Benthic Habitats (SNH, 2011)
Cefas – Guidance Note for Environmental Impact Assessment in Respect of Food and Environmental Protection Act (FEPA) and Coast Protection Act (CPA) Requirements (Cefas, 2004)
Cefas - Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects (Cefas, 2012)
Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2024)
Descriptions of Scottish Priority Marine Features (PMFs) (Tyler-Walters <i>et al.</i> 2016)
The identification of the main characteristics of stony reef habitats under the Habitats Directive (Irving, 2009)
Refining the criteria for defining areas with a 'low resemblance' to Annex I stony reef (Golding <i>et al.</i> 2020)
Decommissioning of Offshore Renewable Energy Installations Under the Energy Act: Guidance Notes for Industry (BEIS, 2019)

6.5.6.4. Assessment Methodology

The Offshore EIAR will follow the methodology described in Chapter 4: Proposed Approach to EIA. Further refinement of the methodology and Wider Study Area will be undertaken prior to the chapter being written as part of the baseline and stakeholder engagement. Cumulative and transboundary effects are also discussed in Chapter 4: Proposed Approach to EIA, and assessment of these will apply to Benthic and Intertidal Ecology.

The main aim of the Benthic and Intertidal Ecology assessment is to further understand and characterise the existing environment in the Benthic and Intertidal Ecology Study Area. A greater understanding of the key receptors identified, including intertidal and subtidal benthic ecology, will assist in providing a firm baseline for any potential effect of the Offshore Project.

The Offshore EIAR will apply standard EIA methodology to demonstrate the significance of the effects anticipated from the Offshore Project, considering both individual and cumulative impacts in relation to other relevant plans, projects, and activities, if necessary. The assessment will focus on the potential

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magnitude of change to baseline conditions caused by the Offshore Project, the sensitivity of affected receptors, and any proposed mitigation measures.

Magnitude and duration of impact will be considered under the Benthic and Intertidal Ecology assessment, alongside the reversibility of the impact and the timing and frequency of the activity. An assessment of the likely significant effects of the Offshore Project will be undertaken through application of the evidence base.


Stakeholder consultation will be undertaken at pivotal points throughout the EIA process to ensure that the approach, including the application of the evidence base, satisfies the requirements of both stakeholders and regulators, such as after scoping, prior to commencement, and at the draft production of the chapter during the Offshore EIAR.

The baseline (Section 6.5.3) identifies the Benthic and Intertidal Ecology receptors potentially present within the Benthic and Intertidal Ecology Study Area, from which receptor groups will be determined and updated based on the environmental survey.

Similar types of habitats in terms of their sensitivity to potential impacts will be grouped to form Valued Ecological Receptors (VERs). This will allow an ease of assessment and presentation. Sensitivities will be based on the FeAST and where relevant the MarESA, as detailed on the MD and Marine Life Information Network (MarLIN) website. Determination of whether predicted impacts are likely to be significant will be made relating to the sensitivity (tolerance, adaptability, and recoverability) and an assessment of magnitude of impact on a benthic receptor. Magnitude of impact will be dependent on scale, duration of effect, frequency of occurrence, and reversibility.

A Source-Pathway-Receptor (S-P-R) conceptual model will predicate the assessment of effects on subtidal and intertidal ecology whereby the source is the initiator event, the pathway is the link between the source and the receptor impacted by the effect, and the receptor is the receiving entity. An example of the S-P-R conceptual model is provided by drag-embedment anchors buried in the seabed which disturbs sediment on the seabed (source). The disturbed sediment is then transported by tidal currents until it settles back to the seabed (pathway). The deposited sediment could smother and have an effect on the species on this area of the seabed (receptor). Consideration of the potential effects of the Offshore Project will be carried out over the Array Area and Offshore Cable Corridor Area of Search up to the MHWS (near-field) and the wider area (far-field) that might also be affected indirectly by the Offshore Project. Potential impacts from all phases of development (construction, operation, maintenance, and decommissioning) will be considered.

Outputs from the physical process assessment (e.g., level and spatial extent of sediment plumes and/or changes in sediment transport) will provide the basis of the Benthic and Intertidal Ecology assessment,

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along with quantified values of temporary habitat disturbance and habitat loss derived from the final project parameters.

6.5.7. SCOPING QUESTIONS FOR CONSULTEES

Scoping questions for consultees in relation to the Benthic and Intertidal Ecology Assessment include:

1. Do you agree that the data sources referenced above to inform the baseline are valid for the purposes of this scoping assessment? Should any other data sources be considered?
2. Have all Benthic and Intertidal Ecology impacts that could result from the Offshore Project been identified?
3. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts for Benthic and Intertidal Ecology? Do you agree with the methodology described for assessing the effects of these impacts?
4. Do you agree with the assessment methodology proposed to be undertaken within the Offshore EIAR?
5. Do you agree that the designed in mitigation described provide a suitable means for managing and mitigating the relevant potential effects of the Offshore Project on Benthic and Intertidal Ecology receptors?

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6.6. FISH AND SHELLFISH ECOLOGY

6.6.1. INTRODUCTION

This chapter of the Offshore Scoping Report provides an overview of the baseline environment for Fish and Shellfish Ecology within the Array Area and Offshore Cable Corridor Area of Search. It also includes a scoping assessment of likely significant effects for the relevant receptors, from the construction, operation (including maintenance), and decommissioning phases of the Offshore Project.

6.6.2. STUDY AREA

The Fish and Shellfish Ecology Study Area has been delineated based on the International Council for the Exploration of the Seas (ICES) Statistical Rectangles. These areas are used to indicate the observed and known movement patterns of fish and shellfish species.

The Array Area is located in the northeastern part of ICES Division 6a (West of Scotland (WoS)). For recording and identifying fisheries data, ICES divisions are further subdivided into statistical rectangles. These rectangles form a grid covering the region between 36°N and 85°30'N latitude, and 44°W and 68°30'E longitude.

The ICES Rectangles 45E5, 46E4, 46E5, 46E6 and 47E4 encompass the Array Area and Offshore Cable Corridor Area of Search on the north coast of Scotland and area surrounding the development (11,413 km²). ICES Rectangle 45E5 has been included within the Fish and Shellfish Ecology Study Area as it contains two shellfish waters designated under the WFD (Kyle of Durness and Loch Eriboll). Species with extensive natural foraging ranges are highly likely to be present within these ICES Statistical Rectangles, which form the Fish and Shellfish Ecology Study Area as shown in Figure 6.6-1. Due to the migratory aspect of diadromous fish receptors, the ICES Rectangles are not fully encompassing of potential overlap with protected populations within SACs. Consideration will be given to any designated migratory fish populations associated with SAC sites within 100 km of the boundary of the Array Area and Offshore Cable Corridor Area of Search (see Figure 6.6-2). This will ensure that potential impacts to these populations is assessed regardless of whether they fall within or outside the Fish and Shellfish Ecology Study Area. A 100 km buffer was selected to align with the approach taken for assessing potential impacts to migratory fish within other OWF project assessments proposed in Scottish waters.

The scoping design envelope extends to MHWS meaning impacts from offshore infrastructure are considered for receptors below MHWS (impacts from offshore infrastructure will be considered for receptors above MHWS only where applicable). It should be noted that the topic-specific study area will vary depending on the nature and scale of each receptor, or associated pathway, that could result in a receptor effect.

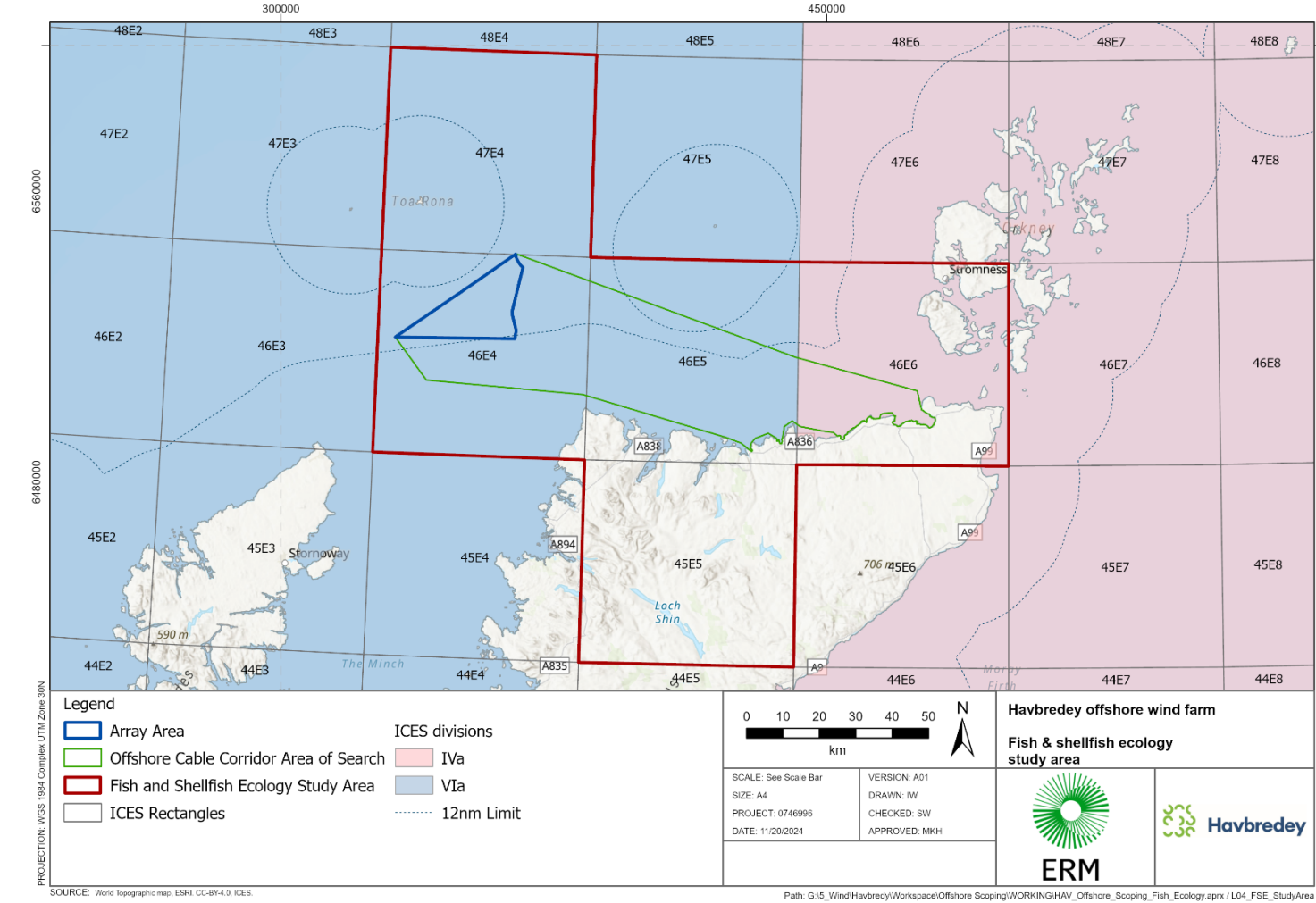


Figure 6.6-1 Fish and Shellfish Ecology Study Area Defined by ICES Rectangles 45E5, 46E4, 46E5, 46E6 and 47E

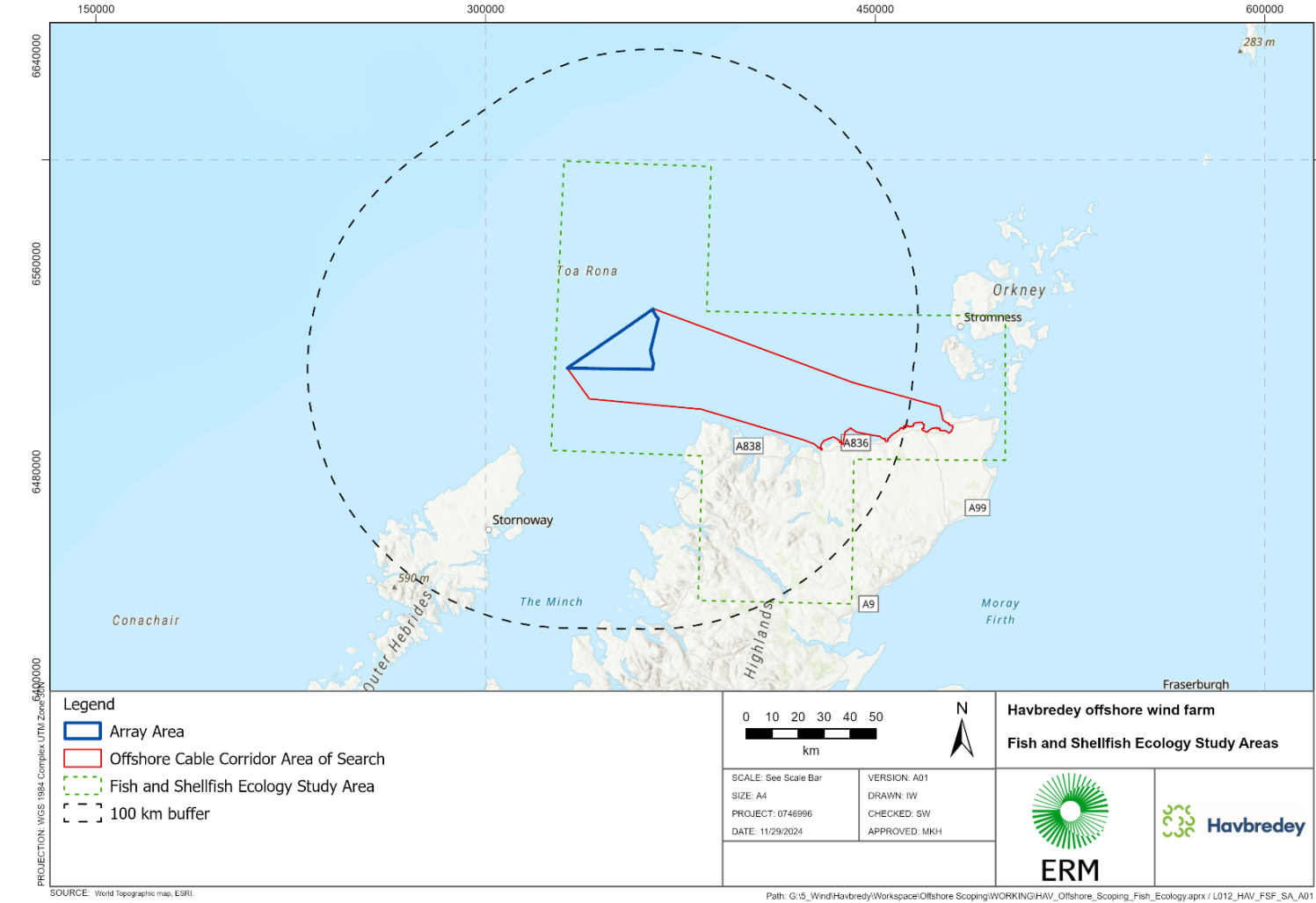



Figure 6.6-2 Fish and Shellfish Ecology Study Area and 100 km Buffer Around Array Area

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6.6.3. BASELINE ENVIRONMENT

6.6.3.1. Data Sources


Data sources used to inform this Fish and Shellfish Ecology Chapter of the Offshore Scoping Report are presented in Table 6.6-1.

Table 6.6-1 Summary of Key Data Sources for Fish and Shellfish Ecology


Source	Spatial Coverage	Year	Summary
Distribution of spawning and nursery grounds identified by Coull <i>et al.</i> (1998), Ellis <i>et al.</i> (2012), and Aires <i>et al.</i> (2014)	The entire Fish and Shellfish Ecology Study Area and the rest of the UK's coastal waters	Various	These datasets are widely used to identify the known spawning and nursery grounds of various fish species in the UK and its surrounding waters
Northland Power, Spiorad na Mara Offshore Wind Farm Scoping Report	The Spiorad na Mara study relevant to fish and shellfish ecology is comprised of ICES Rectangles 46E3, 45E3 and 45E2, located to the west and southwest of the Fish and Shellfish Ecology Study Area (45E5, 46E4, 46E5, 46E6 and 47E4)	2023	Scoping report of an Offshore Wind Development off the northwest coast of the Isle of Lewis, located southwest from the Array Area
MMO (2024) UK Fleet Landings Data (including Weight and Value) by species ⁹	Data will be obtained for ICES Statistical Rectangles within the Fish and Shellfish Ecology Study Area (45E5, 46E4, 46E5, 46E6 and 47E4)	2014 – 2023	Landings data from fisheries operating vessels within UK waters, directly sampling fish assemblages within each ICES Statistical Rectangle
MD (2024) Scottish Sea Fisheries Statistics 2023 ¹⁰	The entire Fish and Shellfish Ecology Study Area (ICES Statistical	2014-2023	Landings data by Scottish registered vessels within Scottish waters.

⁹ Available online at: [UK sea fisheries annual statistics report 2021 - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/115555/uk-sea-fisheries-annual-statistics-report-2021.pdf).


¹⁰ Available online at: <https://www.gov.scot/publications/scottish-sea-fisheries-statistics-2023/pages/>

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Source	Spatial Coverage	Year	Summary
	Rectangles 45E5, 46E4, 46E5, 46E6 and 47E4)		
Scottish Sea Fisheries Statistics 2021 Landings Data	The entire Fish and Shellfish Ecology Study Area (ICES Statistical Rectangles 45E5, 46E4, 46E5, 46E6 and 47E4)	2017 – 2021	MD (formerly Marine Scotland) holds information on landings (tonnage and value) collected from UK vessels in the UK and abroad waters. Data from foreign vessels working in UK waters will also be catalogued from ICES rectangle and species type data sources
International Bottom Trawl Survey (ICES, 2023)	Fish and Shellfish Ecology Study Area (ICES Statistical Rectangles 45E5, 46E4, 46E5, 46E6 and 47E4)	Most recent report published in 2023	The International Bottom Trawl Survey Working Group (IBTSWG) coordinates fishery-independent multispecies bottom-trawl surveys within the ICES area
Malcom <i>et al.</i> (2010)	The entire Fish and Shellfish Ecology Study Area and Scotland's coastal waters was surveyed during this study	2010	This report outlines the main spawning routes and behaviours of Atlantic salmon <i>Salmo salar</i> , brown trout <i>Salmo trutta</i> , and European eel <i>Anguilla anguilla</i> in and around the Fish and Shellfish Ecology Study Area.
The Marine Life Information Network	The entire Fish and Shellfish Ecology Study Area and the rest of the UK's coastal waters	2024	Information on the biology of species and the ecology of habitats found around the coasts and seas of the British Isles
West of Orkney EIAR	The West of Orkney study area includes ICES Rectangles 46E5, 46E6, 47E6 and 47E5	2022	This report identifies a fish and shellfish baseline. The study area relevant to fish and shellfish ecology presented in the West of Orkney EIAR will help to illustrate the wider distribution of natural resources in the Fish and Shellfish Ecology Study Area. These details will help to provide context and distribution of other species and their tolerance

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Source	Spatial Coverage	Year	Summary
Descriptions of Scottish Priority Marine Features (PMFs) (Tyler-Walters <i>et al.</i> 2016)	The entire Fish and Shellfish Ecology Study Area and the rest of the Scotland's waters out to the limit of the UKCS	2016	The report includes a descriptive catalogue of the 81 PMFs that have been identified in the seas around Scotland
Pentland FLOW EIAR	Partial coverage of the Fish and Shellfish Ecology Study Area	2022	This report identifies a fish and shellfish baseline. The study area relevant to fish and shellfish ecology presented in the Pentland Floating Offshore Wind EIAR will help to illustrate the wider distribution of natural resources in the Fish and Shellfish Ecology Study Area. These details will help to provide context and distribution of other species and their tolerance
Régnier <i>et al.</i> 2024	The entire Fish and Shellfish Ecology Study Area and Scotland's coastal waters was assigned an interpolated abundance score during this study	2024	This report utilises extensive fisheries data to identify the presence, and estimate abundance, of elasmobranch species in Scottish waters. In addition, the report presents information on habitat preference that could be used to predict presence
Shark ID Guides (The Shark Trust, 2025)	The entire Fish and Shellfish Ecology Study Area and the rest of the British Isles and Northeast Atlantic waters	2025	A series of identification guides for shark, skates, rays and chimaeras known to occur in British water and the Northeast Atlantic
UK Offshore Energy Strategic Environmental Assessment 4. Appendix 1a.4 Fish and Shellfish (BEIS, 2022)	The entire Fish and Shellfish Ecology Study Area and the rest of the British Isles and Northeast Atlantic waters	2022	Appendix 1a.4 describes the distribution and ecology of fish and commercially important shellfish species in UK waters, with reference, where information is available, to spawning and nursery grounds

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Source	Spatial Coverage	Year	Summary
Essential spawning grounds of Scottish herring: current knowledge and future challenges (Frost and Diele, 2022)	The entire Fish and Shellfish Ecology Study Area and the rest of the UK's coastal waters	2022	Information on location, characteristics and status of historic and contemporary spawning grounds of Scottish herring
A Verified Distribution Model for the Lesser Sandeel. (Langton <i>et al.</i> 2021)	The entire Fish and Shellfish Ecology Study Area and the rest of the British Isles and Northeast Atlantic waters	2021	Species distribution models to predict the occurrence and density of sandeel in parts of the North Sea and Celtic Seas
Predicting habitat suitability for basking sharks (<i>Cetorhinus maximus</i>) in UK waters using ensemble ecological niche modelling (Austin <i>et al.</i> 2019)	The entire Fish and Shellfish Ecology Study Area and the rest of the UK's waters	2019	Habitat suitability for basking shark in UK waters and subsequent spatial distribution of basking sharks to inform the implementation of management measures
A review of the geographic distribution, status, and conservation of Scotland's lampreys (Hume, 2017)	Scottish waters	2017	Study presenting the geographic distribution, status, and conservation of sea lamprey <i>Petromyzon marinus</i> , European river lamprey <i>Lampetra fluviatilis</i> , and European brook lamprey <i>Lampetra planeri</i>
Spawning grounds of Atlantic cod (<i>Gadus morhua</i>) in the North Sea (González-Irusta and Wright, 2016)	The entire Fish and Shellfish Ecology Study Area and the North Sea	2015	Study to predict the spawning habitat of North Sea cod, using generalised additive models
Crab and lobster fisheries in Scotland: Results of Stock Assessments 2009-2012 (Mesquita <i>et al.</i> 2017)	The entire Fish and Shellfish Ecology Study Area and Scottish waters	2013-2015	This report outlines the findings of stock assessments for Scottish regional brown crab <i>Cancer pagurus</i> , velvet crab <i>Necora puber</i> , and lobster <i>Homarus gammarus</i> , conducted by

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Source	Spatial Coverage	Year	Summary
			Marine Scotland Science (MSS) for the period 2013–2015
Spatio-Temporal Variability in Scottish Smolt Emigration Times and Sizes (Malcom <i>et al.</i> (2015))	The entire Fish and Shellfish Ecology Study Area and Scottish coastal waters	2015	Assessment of pre-existing information on smolt migration timing and sizes to identify sensitive periods and locations for development, and to inform future acoustic tagging studies that aim to improve understanding of coastal movements and behaviour
Basking shark satellite tagging project: insights into basking shark (<i>Cetorhinus maximus</i>) movement, distribution and behaviour using satellite telemetry (Phase 1, July 2014) (Witt <i>et al.</i> 2014)	Partial coverage of the Fish and Shellfish Ecology Study Area, west coast of Scotland	2014	Analysis, interpretation and comment on data resulting from two years of tag deployments, with focus on basking shark movements within the Sea of the Hebrides and the Skye to Mull MPA search location
Basking sharks in the northeast Atlantic: spatio-temporal trends from sightings in UK waters (Witt <i>et al.</i> 2012)	Partial coverage of the Fish and Shellfish Ecology Study Area and the rest of the UK's waters	2012	Analysis of records from 1988 to 2008 from 2 public recording databases operating in the UK to describe 3 sightings hotspots: western Scotland, Isle of Man and southwest England, and highlight the marked seasonality of basking shark sightings
Scotland's Marine Atlas: Information for the National Marine Plan Scottish Government (Baxter <i>et al.</i> 2011)	The entire Fish and Shellfish Ecology Study Area and the rest of the Scottish waters	2011	An assessment of the condition of Scotland's seas, based on scientific evidence from data and analysis and supported by expert judgement
North Sea Elasmobranchs: distribution, abundance, and biodiversity, ICES (Daan <i>et al.</i> 2005)	Partial coverage of the Fish and Shellfish Ecology Study Area and the North Sea	2005	Distribution of all elasmobranch species caught in the North Sea over the past 30 years, based on presence-absence and at a high spatial resolution

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6.6.3.2. Overview of the Baseline Environment

Supporting this Offshore Scoping Report, an initial desk-based review of literature and available data sources (see Table 6.6-1) has been undertaken; the findings are presented below, to provide an understanding of the baseline environment for Fish and Shellfish Ecology.

Based on the initial desk-based review of literature and available data sources, the key receptors for Fish and Shellfish Ecology are:

- Elasmobranchs
- Demersal Fish
- Pelagic fish
- Migratory Fish
- Shellfish

Elasmobranchs


Elasmobranch species likely to be present within the Fish and Shellfish Ecology Study Area including various species of skate and ray:

- Common skate *Dipturus batis*
- Flapper skate *Dipturus intermedius* / blue skate *Dipturus flossada* complex
- Thornback ray *Raja clavata*
- Sandy ray *Leucoraja circularis*
- Blonde ray *Raja brachyura*
- Starry ray *Raja radiata*
- Spotted ray *Raja montagui*

Other elasmobranch species likely to be present include benthopelagic and pelagic species, such as:

- Greater argentine *Argentina silus*
- Tope shark *Galeorhinus galeus*
- Spurdog *Squalus acanthias*
- Portuguese dogfish *Centroscymnus coelolepis*

These species are likely to travel through the area due to their extensive foraging ranges. Low intensity nursery grounds for spotted ray, thornback ray and tope shark are present within the Fish and Shellfish Ecology Study Area, and high intensity spurdog nurse grounds are present (Ellis *et al.* 2012). Larger elasmobranch species within the Fish and Shellfish Ecology Study Area, such as basking sharks, experience

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impact pathways similar to those of marine mammals, such as risk of injury from collision with vessels, noise and vibration and sediment plumes (refer to Chapter 6.7: Marine Mammals and Other Megafauna).

Demersal Fish

The Array Area is situated in an area of predominantly MD32 ‘Atlantic offshore circalittoral coarse sediment’, with areas of MD52 ‘Atlantic offshore circalittoral sand’ present within the southwest and northeast parts of the Array Area. The surrounding area and Offshore Cable Corridor Area of Search is heterogeneous in nature. The coastline between Bettyhill and Dunnet is largely characterised by rocky coastline with sandy beaches within sheltered bays.

These habitats support a range of benthic and benthopelagic fish that feed on or near the seabed. Notably, the outcrops of circalittoral rock and other hard substrata are home to species such as:

- Gobiidae (gobies)
- Blenniidae (blennies)
- Labridae (wrasses)


Some Gobiidae and Blenniidae species are also found in infralittoral rock and hard substrata.

The Fish and Shellfish Ecology Study Area is considered to support key spawning grounds for Atlantic cod *Gadus morhua*, European plaice *Pleuronectes platessa*, and sandeel Ammodytidae spp. (Coull *et al.* 1998; Ellis *et al.* 2012). The area is also expected to represent nursery grounds for anglerfish *Lophius* spp., Atlantic cod, whiting *Merlangius merlangus*, and sandeel (Coull *et al.* 1998; Ellis *et al.* 2012).

Sandeel species, classified under the family Ammodytidae, are of high conservation importance within the Fish and Shellfish Ecology Study Area. In Scottish waters, the most common species are:

- Raitt’s sandeel *Ammodytes marinus*
- Lesser sandeel *Ammodytes tobianus*

These species are crucial prey for larger marine predators. During winter and at night throughout the year, sandeels bury themselves in sediment, typically to depths between 4 and 6 cm (Holland *et al.* 2005). They prefer medium to coarse sand and thrive in habitats where fine sediment content is $\leq 2\%$. Areas with $>4\%$ fine sediment content are generally unsuitable for sandeels. Following the methodology in Reach *et al.* (2024), the Array Area is characterised by suitable habitat types (sands), and potentially suitable habitats (coarse substrates) for supporting sandeel (EMODnet, 2024). The sand and coarse sediment mosaic represents the majority of sediments surrounding the Array Area and the Offshore Cable Corridor Area of

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Search, with isolated extents of hard substrata to the north part of the Fish and Shellfish Ecology Study Area (Figure 6.6-3).

Additional modelling conducted by Marine Scotland Science (now referred to as MD-SEDD) (Langton *et al.* 2021) indicates that most of the Fish and Shellfish Ecology Study Area (including the Array Area) has a predicted sandeel density of zero individuals per square metre, suggesting that sandeels are effectively absent from the Array Area. To the southeast of the Array Area, in the coastal area of mainland Scotland, Cape Wrath, the density of sandeel ranges from 30 per m² to 90 per m². However, the study reported by Langton *et al.* (2021) did not include the north coast of Scotland, where the proposed Offshore Cable Corridor Area of Search makes landfall.

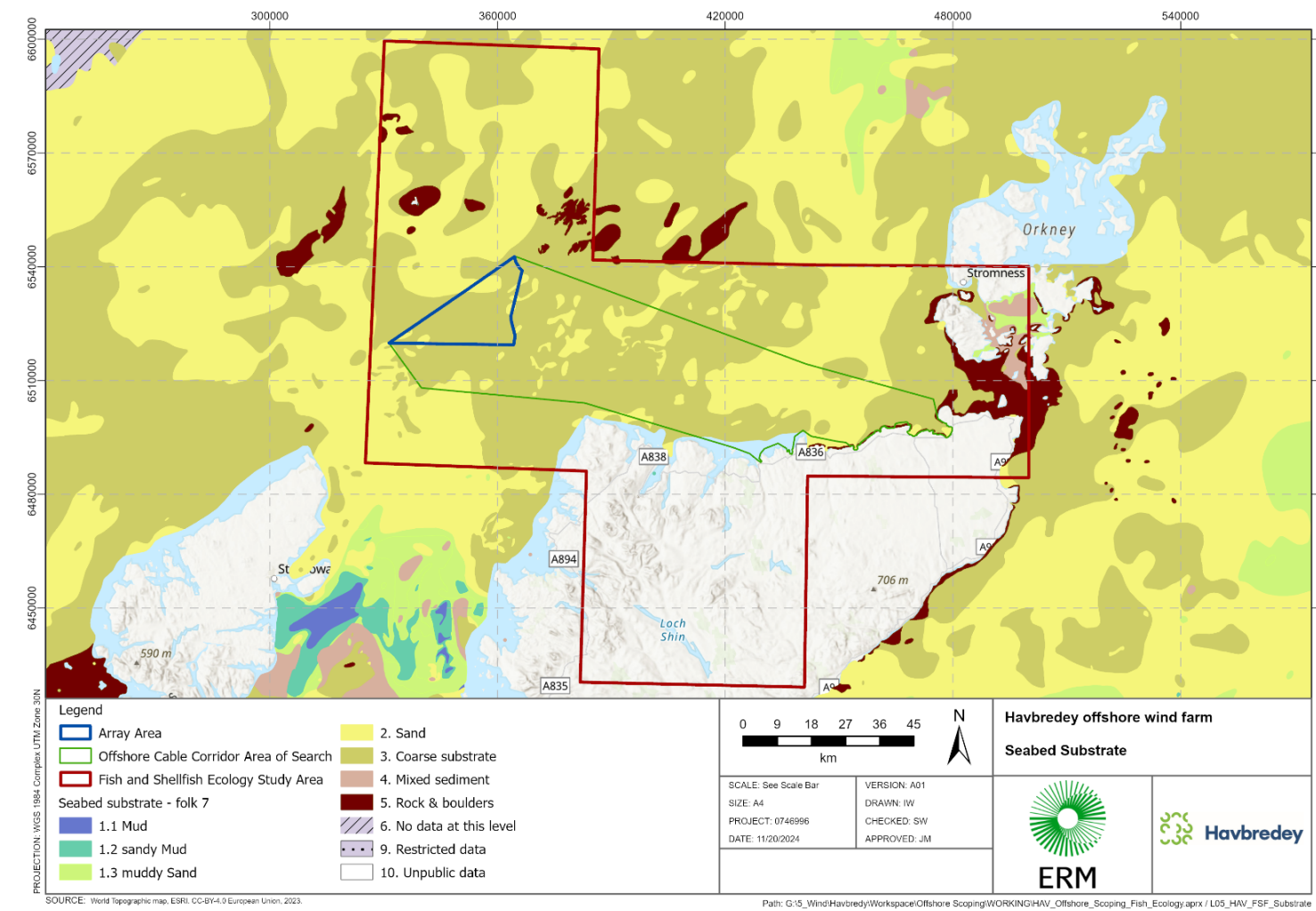



Figure 6.6-3 EMODnet 1:250k Seabed Sediment Types Within the Vicinity of the Offshore Project (EMODnet, 2024)

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Pelagic Fish

The Fish and Shellfish Ecology Study Area covers depths ranging from 0 m at landfall to approximately 116 m. The area supports pelagic species such as Atlantic herring *Clupea harengus*, European pilchard *Sardina pilchardus*, Atlantic mackerel *Scomber scombrus*, and horse mackerel *Trachurus trachurus*, which use the area as a feeding ground and potentially as both benthic and pelagic spawning grounds, depending on the species. The Fish and Shellfish Ecology Study Area is considered to support key spawning and nursery grounds for Atlantic herring and Atlantic mackerel. (Coull *et al.* 1998; Ellis *et al.* 2012).

Atlantic herring play a crucial role as prey for a variety of fish, birds, and marine mammals. While Atlantic herring are a pelagic species as adults, their spawning behaviour is benthic, relying on specific seabed conditions to lay eggs. Suitable seabed habitats for Atlantic herring spawning include gravel and sandy gravel (preferred) and gravelly sand (marginal), which provide the appropriate surface for eggs to adhere to (Kyle-Henney *et al.* 2024). However, other environmental factors such as seabed flow rates and sediment oxygenation are also critical in determining habitat suitability. Therefore, sediment type will not be the only factor considered in determining if a habitat is likely to support a viable herring population (O’Sullivan *et al.* 2013).

The Fish and Shellfish Ecology Study Area is located within the WoS Spawning Grounds, as identified by Frost and Diele (2022). This population includes two distinct groups of Atlantic herring: spring and autumn spawners. The spring-spawning group is known to spawn in the Minch (ICES, 2022), located southwest of the Fish and Shellfish Ecology Study Area. The spring-spawning group was historically the most abundant in the WoS until the stock collapsed in the 1950s, though it has been slowly recovering; notably, major spring-spawning events were recorded in 2018 and 2019, possibly linked to harsh winters (Frost and Diele, 2022). This group is also associated with spawning eggs on maerl beds in the region (Morrison *et al.* 1991; Frost and Diele, 2022).


The WoS autumn-spawning group, which spawns around Cape Wrath (located southeast of the Array Area, has been in decline since the 1970s (Frost and Diele, 2022).

Using the methodology from Kyle-Henney *et al.* (2024), the Fish and Shellfish Ecology Study Area is characterised by preferred and marginal habitats for supporting Atlantic herring spawning, indicated by coarse sediment types within Figure 6.6-3.

Migratory Fish

Scotland's northwest coast serves as a key migration route for several species, including:

- Atlantic salmon *Salmo salar* – listed in Annex II of the European Commission (EC) Habitats Directive

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- European eel *Anguilla anguilla* – listed in Annex II and as a UK Biodiversity Action Plan (BAP) priority species

Protected species are likely to be present in the Fish and Shellfish Ecology Study Area, such as sea lamprey *Petromyzon marinus* and river lamprey *Lampetra fluviatilis*. At the time of drafting this document, there is insufficient data on their migration patterns. Therefore, as a matter of precaution these species will be considered in the Fish and Shellfish Ecology Study Area. The location of protected areas relevant to this topic within 100 km of the Array Area is shown in Figure 6.6-4.


Salmonids

Atlantic salmon, when returning from marine feeding grounds, often favour migration routes along the northern and western Scottish coasts (Malcolm *et al.* 2010). They may travel through the Fish and Shellfish Ecology Study Area, leading them into the Minch and onward to their natal rivers along the west coast of Scotland and the north coast of Ireland. However, the migration routes of post-smolts remain poorly understood.

Salmon tagging studies have shown a west-to-east migration of returning Atlantic Salmon across the north coast of Scotland (Malcolm *et al.* 2010; Youngson, 2017), which are shown to vary in origin from nearby river stocks and from rivers hundreds of kilometres away (Downie *et al.* 2018). The abundance of homing migrating salmon in and around the Fish and Shellfish Ecology Study Area is likely to vary due to the proximity of two migratory routes which interact with the Minch; a route directly along the north coast of Scotland and a route north around Orkney and Shetland Islands (Malcolm *et al.* 2010; ABPmer, 2014; Downie *et al.* 2018). The Atlantic salmon spawning season peaks between June and August, with smolt migration occurring downstream to the sea during the spring (Ashley, 2019; Marine Scotland, 2022). Factors such as migration timing (McLennan *et al.* 2018) and swimming depth (Godfrey *et al.* 2015) are important for determining the significance of potential effects associated with the Offshore Project. Early studies suggest that both adult Atlantic salmon and post-smolts prefer the upper 10 m of the water column (Holm *et al.* 2000; Davidsen *et al.* 2008; Godfrey *et al.* 2015).

Other salmonids present in the area include the following species; however, these species are not designated features within the region:

- Brown trout (sea trout) *Salmo trutta*
- Arctic charr *Salvelinus alpinus*

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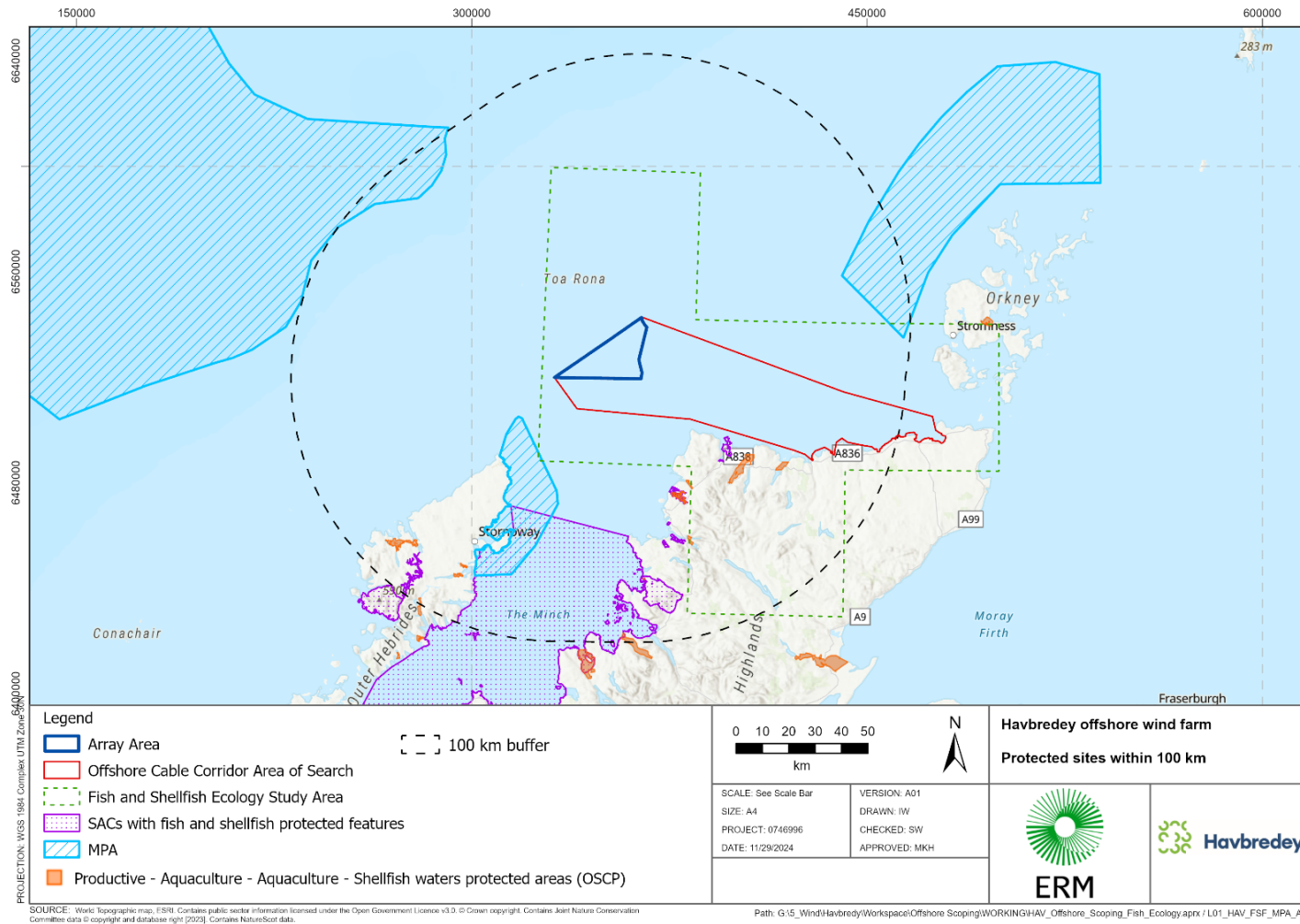



Figure 6.6-4 The Location of Relevant Protected Areas Within the Fish and Shellfish Ecology Study Area and 100 km of the Array Area

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Eels

Scottish coastal waters provide a hotspot for European eel, offering numerous small rivers and water bodies where the species can mature before migrating to the Sargasso Sea in the North Atlantic to spawn. Waters in the north coast of mainland Scotland, Orkney and Shetland and the Outer Hebrides are likely to contain populations from northern continental Europe and the UK passing through the Fish and Shellfish Ecology Study Area (Malcolm *et al.* 2010). Most eels in coastal waters of Scotland are expected to be juvenile eels which have not yet entered freshwater, migrating to Scottish rivers (NatureScot, 2022). Their migration pathways are still poorly understood and the distribution or abundance of European eel within the Fish and Shellfish Ecology Study Area is unclear, and so they have been assumed as present.

Shellfish

A number of shellfish species are likely present within the Fish and Shellfish Ecology Study Area, including:


- European spiny lobster (crawfish) *Palinurus elephas*
- Norway lobster (Nephrops) *Nephrops norvegicus*
- Green crab *Carcinus maenas*
- Velvet swimming crab *Necora puber*
- Brown crab *Cancer pagarus*
- Brown shrimp *Crangon crangon*
- Razor clams *Solen spp.*
- Common whelk *Buccinum undatum*
- Pacific oysters *Crassostrea gigas*
- Blue mussel *Mytilus edulis*

Spawning grounds for *Nephrops* are present within the southern section of ICES Rectangle 46E4, which is within the Fish and Shellfish Ecology Study Area.

Two shellfish waters designated under the WFD are located within the Fish and Shellfish Ecology Study Area:

- Kyle of Durness: Kyle of Tongue (SWPA22) located 6.1 km south of the Offshore Cable Corridor Area of Search
- Loch Eriboll: Loch Eriboll (SWPA35) located 4.5 km south of the Offshore Cable Corridor Area of Search

Kyle of Tongue is harvested for Pacific oysters, and Loch Eriboll is harvested for blue mussel and Pacific oysters. Figure 6.6-4 shows the location of these designated areas relative to the Offshore Project.

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6.6.4. DESIGNED IN MITIGATION

The designed in mitigation relevant to the Fish and Shellfish Ecology assessment, which have been incorporated into the current design of the Offshore Project, is outlined below in Table 6.6-2.


Table 6.6-2 Fish and Shellfish Ecology Designed In Mitigation Measures

ID	Designed In Measure	How the measure will be secured
ID003	A CEMP and PEMP will be developed prior to construction and adhered to in compliance with legislative requirements and best practice standards and guidance.	Secured under Section 36 and/or Marine Licence consent conditions.
ID006	The Project will adhere to requirements of relevant international conventions, including MARPOL 73/78.	Secured under Section 36 and/or Marine Licence consent conditions.
ID007	Best practice techniques will be employed through all phases of the Project, and measures will be provided in a MPCP, which will form part of the CEMP and PEMP. SOPEPs will be developed for the Project prior to construction.	Secured under Section 36 and/or Marine Licence consent conditions.
ID009	Compliance with the International Convention for the Control and Management of Ship's Ballast Water and Sediments and adherence to INNS Management Plan to reduce the risk of introducing or spreading invasive species.	Secured under Section 36 and/or Marine Licence consent conditions.
ID012	As part of scheduled maintenance mooring lines and cables will undergo regular inspection. In the event discarded fishing gear is found entangled in these lines/cables a risk-based assessment will be carried out to determine if the fishing gear requires removal.	Secured under Section 36 and/or Marine Licence consent conditions.

6.6.5. SUMMARY OF KEY RECEPTORS, SENSITIVITIES AND LIKELY SIGNIFICANT EFFECTS

The key receptors to be considered within the Offshore EIAR include:

- Elasmobranchs
- Demersal fish
- Pelagic fish
- Migratory fish
- Shellfish

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6.6.5.1. Likely Significant Effects

The scoping of likely significant effects on Fish and Shellfish Ecology receptors which may arise within the Fish and Shellfish Ecology Study Area via the Offshore Project, is outlined in Table 6.6-3.




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Table 6.6-3 EIA Scoping Assessment for Fish and Shellfish Ecology


Potential Impact	Scoping Result	Justification	Assessment Method
Construction and Decommissioning			
Temporary seabed habitat loss and/or disturbance	In	Temporary loss of seabed habitat may reduce resources (e.g. such as prey or structural features) and affect spawning or nursery grounds within the Fish and Shellfish Ecology Study Area. The significance of this impact will depend on the scale of direct seabed disturbance during construction and decommissioning.	A desktop review of relevant literature and project-specific worst-case of direct seabed habitat disturbance.
Increases in SSC	In	Direct interaction with the seabed during the installation, maintenance or removal of objects may release fine sediments into the water, which could then cause a plume of sediment over a larger area. A decline in water quality may harm fish and shellfish populations and affect the success of pelagic spawning within the Fish and Shellfish Ecology Study Area. The scale and timing of seabed disturbance during construction, operation and maintenance and decommissioning will influence the significance of this impact.	A desktop review of appropriate literature, the spreadsheet-based tools for extent and concentration of any sediment plumes and additional factors identified within Chapter 6.1: Physical and Coastal Processes.
Reduction in water quality due to the release of	In	Direct interaction with the seabed during the installation or removal of objects may release	A desktop review of appropriate literature, the spreadsheet-based tools for extent and concentration of

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Potential Impact	Scoping Result	Justification	Assessment Method
contaminants from seabed sediment disturbance		sequestered contaminants into the water column. A decline in water quality may harm fish and shellfish populations and affect the success of pelagic spawning within the Fish and Shellfish Ecology Study Area. The scale and timing of seabed disturbance during construction and decommissioning will influence the significance of this impact.	any sediment plumes and additional factors identified within Chapter 6.1: Physical and Coastal Processes.
INNS	Out	Increased vessel activity during construction and decommissioning phases will increase the potential risk of introduction of INNS into the area. The Offshore Project is located away from large ports, and as such, it is likely that INNS resident, or newly introduced, may extend their range. However, industry best practice will be followed such as adherence with the International Convention for the Control and Management of Ship's Ballast Water and Sediments and adherence to INNS Management Plan to reduce the risk of introducing or spreading invasive species. Therefore, this impact has been scoped out from the Offshore EIAR.	N/A

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Potential Impact	Scoping Result	Justification	Assessment Method
Underwater noise and vibration	In	Noise and vibration generated during construction and decommissioning (e.g. piling, pre-construction surveys, drilling & UXO clearance) in the Fish and Shellfish Ecology Study Area may cause injury and/or disturbance to fish receptors, or disrupt migration pathways for anadromous and diadromous fish.	A desk-based assessment drawing on existing literature and reviews regarding fish species sensitivity to underwater noise and vibration, alongside project-specific survey data and underwater noise modelling, as outlined in Chapter 6.2: Underwater Noise.
Accidental release of pollutants from vessels, WTGs, and plant machinery	Out	Accidental spills of pollutants from equipment during construction and decommissioning may adversely affect fish and shellfish populations in the Fish and Shellfish Ecology Study Area. However, adherence to the CEMP, which follows best practices and complies with MARPOL and SOPEPs, will reduce the risk and mitigate the impact of any accidental releases. Therefore, this impact has been scoped out from the Offshore EIAR.	N/A
Primary and secondary entanglement from construction of infrastructure, including static inter-array cables	Out	Primary and secondary entanglement of Fish and Shellfish Ecology receptors upon encountering infrastructure is unlikely given the size and physical characteristics of static inter-array cables, dynamic cables and mooring systems. Therefore, this impact has been scoped out from the Offshore EIAR.	N/A

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Potential Impact	Scoping Result	Justification	Assessment Method
and dynamic cales in the water column			
Operations and Maintenance			
Increases in SSC	In	Direct interaction with the seabed during the maintenance of infrastructure may release fine sediments into the water, which could then cause a plume of sediment over a larger area. A decline in water quality may harm fish and shellfish populations and affect the success of pelagic spawning within the Fish and Shellfish Ecology Study Area. The scale and timing of seabed disturbance during operation and maintenance will influence the significance of this impact.	A desktop review of appropriate literature, the spreadsheet-based tools for extent and concentration of any sediment plumes and additional factors identified within Chapter 6.1: Physical and Coastal Processes.
Accidental release of contaminants through sediment disturbance	In	Operations and maintenance activities may lead to sediment disturbance and has the potential to re-mobilise contaminated sediments into the environment. A decline in water quality may harm fish and shellfish populations and affect the success of pelagic spawning within the Fish and Shellfish Ecology Study Area. The scale and timing of seabed disturbance during operation and maintenance will influence the significance of this impact.	Site-specific data will determine the presence or absence of contaminated sediments in the Fish and Shellfish Ecology Study Area and inform which receptors overlap with the impact.

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Potential Impact	Scoping Result	Justification	Assessment Method
Underwater noise and vibration	In	Noise and vibration generated during operations and maintenance (e.g. vessel traffic) in the Fish and Shellfish Ecology Study Area may cause injury and/or disturbance to fish receptors or disrupt migration pathways for anadromous and diadromous fish.	A desk-based assessment drawing on existing literature and reviews regarding fish species sensitivity to underwater noise and vibration, alongside project-specific survey data and underwater noise modelling, as outlined in Chapter 6.2: Underwater Noise.
Accidental release of pollutants from vessels, WTGs, and plant machinery	Out	Accidental spills of pollutants from equipment during operations and maintenance may adversely affect fish and shellfish populations in the Fish and Shellfish Ecology Study Area. However, the PEMP, which follows best practices and complies with MARPOL and SOPEPs, will reduce the risk and mitigate the impact of any accidental releases. Therefore, this impact has been scoped out from the Offshore EIAR.	N/A
Permanent seabed habitat loss/disturbance	In	Permanent loss of seabed habitat may decrease the availability of resources (such as prey and structural features) and affect spawning and nursery grounds within the Fish and Shellfish Ecology Study Area. The significance of this impact will depend on the extent of direct seabed disturbance during operation and maintenance activities.	A desktop review of relevant literature and project-specific worst-case of direct seabed habitat disturbance.

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Potential Impact	Scoping Result	Justification	Assessment Method
EMF effects and heat emissions from subsea electrical cables	In	<p>Elevated EMF from buried subsea export cables, static inter-array cables and dynamic cables in the water column may have an impact on fish and shellfish behaviour and physiology. The cable power and current type for all subsea cables and the burial depth, cable protection and stabilisation methods (including rock placement, mattressing, grout bags and rock bags) on the seabed for export and static inter-array cables will determine the level of change from baseline EMF, present within the water column. Therefore, this impact has been included for assessment.</p> <p>Water and substrate temperature increase from cables is likely to be a negligible change from baseline conditions. Therefore, temperature effects from cables will not be considered further.</p>	A desk-based baseline review of existing literature specific to EMF effects on fish and shellfish receptors, alongside the PDE will inform the assessment.
Fish and shellfish aggregation effects due to the presence of infrastructure in the water column and on the seabed	In	<p>Hard substrates and structures in the water column and on the seabed will attract fish and shellfish due to biofouling and enhanced habitat complexity. While the baseline ecology of the Fish and Shellfish Ecology Study Area might differ from pre-</p>	Desktop review of existing literature to inform the assessment will be undertaken to determine fish and shellfish aggregation effects due to the introduction of infrastructure and the effect this may have on the baseline

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Potential Impact	Scoping Result	Justification	Assessment Method
		construction conditions. This impact has been included for assessment due to the uniformity of seabed sediments and the potential to attract species that would not typically be present or resident in the Array Area.	fish and shellfish community. The PDE will also be used to inform the assessment.
Primary entanglement from presence of infrastructure, including static inter-array cables and dynamic cables in the water column	Out	Primary entanglement of Fish and Shellfish receptors upon encountering infrastructure is unlikely given the size and physical characteristics of static inter-array cables, dynamic cables and mooring systems. Therefore, this impact has been scoped out from the Offshore EIAR.	N/A
Ghost fishing due to the presence of lost fishing gear entangled/snagged by infrastructure causing secondary entanglement	In	The Offshore Project may act as a barrier to lost mobile fishing gear, and result in snagging throughout the water column and on the seabed, especially on mooring lines and dynamic cables, within the Array Area. Lost fishing gear has potential to cause secondary entanglement (i.e., passive or ghost fishing) and could pose a secondary entanglement risk during the operational and maintenance phase for Fish and Shellfish Ecology receptors.	A desktop review of appropriate literature, alongside baseline knowledge of gear types used within the area as analysed within Chapter 6.10: Commercial Fisheries, as well as the PDE.

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6.6.6. PROPOSED APPROACH TO EIA

6.6.6.1. Relevant Data Sources

Data sources listed within Table 6.6-1, alongside further secondary data sources including published and unpublished papers, journals and reports will be used to inform the EIA. These sources may be further supplemented by any additional material identified during stakeholder consultation. No project-specific fish surveys are planned.


In addition to the data sources highlighted in Table 6.6-1, further information on the distribution of key species within the Fish and Shellfish Ecology Study Area, including migratory salmonids and European eel, will be gathered through desktop studies of relevant peer-reviewed publications and government reports. Key sources for baseline information include:

- Fisheries sensitivity maps (spawning and nursery grounds) for UK waters (Coull *et al.* 1998; Ellis *et al.* 2012; Aires *et al.* 2014)
- International Bottom Trawl Survey data (ICES, 2023)
- Scottish priority marine features (Tyler-Walters *et al.* 2016)
- Various fish tagging studies published by Marine Scotland (now referred to as MD) (Downie *et al.* 2018)

6.6.6.2. Consultation

Consultation and engagement will be key to confirm the methodology and approach to the assessment. Throughout the duration of the Offshore Project, collaboration between the Offshore Project team and external stakeholders will be established. Organisations that will be consulted with respect to this specific EIA topic and the closely associated Commercial Fisheries topic, include:

- NatureScot
- MD-LOT
- The Highland Council
- Fisheries Management Scotland
- Northern District Salmon Fisheries Board
- The Outer Hebrides Regional Inshore Fisheries Group (RIFG)
- The North West Coast RIFG
- The North East Coast RIFG
- Orkney RIFG
- Orkney Fisheries Association

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- Mallaig and Northwest Fishermen’s Association (MNWFA)
- Local Fishing Skippers
- SFO
- SPFA Ltd
- SFF
- SWFPA Ltd
- Scottish Seafood Association (SSA)
- Scottish Creel Fishermen’s Federation
- North and West District Salmon Fisheries Board
- Northern District Salmon Fishery Board
- Scrabster Harbour Trust
- Community Inshore Fisheries Alliance
- Shetland Fishermen’s Association

6.6.6.3. Policy, Legislation and Guidance

The assessment of Fish and Shellfish Ecology will consider the legislation, policy and guidance listed below (Table 6.6-4).

Table 6.6-4 Legislation, Policy and Guidance Relevant to the Fish and Shellfish Ecology Assessment.

Relevant Legislation, Policy and Guidance
Legislation and Policy
Marine Scotland Act, 2010
Marine and Coastal Access Act, 2009
Environmental Assessment (Scotland) Act, 2009
Scottish National Marine Plan, 2015. Part 3: Marine Planning Policy - Fisheries 2 and 3 and Wild Fish 1
UK BAP List of Priority Species
Annex I of the EC Habitats Directive
Annex II of the EC Habitats Directive
Annex V of the EC Habitats Directive
Annex V of the OSPAR Convention
Sectoral Marine Plan (North)
Blue Economy Vision
Marine Strategy Framework Directive and Good Environmental Status
Section 41 of the Natural Environment and Rural Communities (NEARC) Act 2006
The Tope (Prohibition of Fishing) Order 2008

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Relevant Legislation, Policy and Guidance
Guidance
International Union for the Conservation of Nature (IUCN) Red List
Species of Conservation Interest for protection within Nature Conservation Marine Protected Areas (NCMPAs) and SACs
JNCC guidelines for minimising the risk of injury to marine mammals from explosive use in the marine environment 2025

6.6.6.4. Assessment Methodology

The assessment will follow the methodology described in Chapter 4: Proposed Approach to EIA. Further refinement of the methodology will be undertaken prior to the chapter being written as part of the baseline and stakeholder engagement. Cumulative and transboundary effects are also discussed in Chapter 4: Proposed Approach to EIA, and assessment of these will apply to Fish and Shellfish Ecology.


The main aim of the Fish and Shellfish Ecology assessment is to further understand and characterise the existing environment in the Fish and Shellfish Ecology Study Area. A greater understanding of the key receptors identified, will assist in providing a firm baseline for any potential effect of the Offshore Project.

For the assessment of underwater noise, the following receptor groups will be used in accordance with Popper *et al.* (2014):

- Fish with a swim bladder used in hearing
- Fish with a swim bladder not used in hearing
- Fish without a swim bladder
- Eggs and larvae

Table 6.6-5 Impacts on Fish Receptor Groups from Underwater Noise

Underwater Noise Receptor Group	Source of Noise	Mortality and Potential Mortal Injury	Impairment	
			Recoverable Injury	Temporary Threshold Shift
Fish: swim bladder involved in hearing	Continuous noise sources	NA	170 dB root mean square (RMS) for 48 hrs	158 dB RMS for 12 hours
	Pile driving	207 dB cumulative sound exposure (SELcum) > 207 dB peak	203 dB SELcum > 207 dB peak	186 dB SELcum

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Underwater Noise Receptor Group	Source of Noise	Mortality and Potential Mortal Injury	Impairment	
			Recoverable Injury	Temporary Threshold Shift
	Explosions	229 – 234 dB peak	NA	NA
Fish: swim bladder not involved in hearing	Pile driving	210 dB SELcum > 207 dB peak	203 dB SELcum > 207 dB peak	> 186 dB SELcum
	Explosions	229 – 234 dB peak	NA	NA
Fish: no swim bladder	Pile driving	> 219 dB SELcum > 213 dB peak	> 216 dB SELcum > 213 dB peak	> 186 dB SELcum
	Explosions	229 – 234 dB peak	NA	NA
Eggs and larvae	Pile driving	210 dB SELcum > 207 dB peak	Moderate impact nearfield (tens of metres), low impact beyond	Moderate impact nearfield (tens of metres), low impact beyond
	Explosions	> 13 mm s ⁻¹ peak velocity	NA	NA

For impacts scoped in, an assessment will be carried out in the Offshore EIAR to determine the sensitivity of the receptor, the magnitude of impact and the overall significance of the impact. Impacts scoped out at this stage will not be carried forward for assessment.

Magnitude and duration of impact will be considered under the Fish and Shellfish Ecology assessment, alongside the reversibility of the impact and the timing and frequency of the activity. An assessment of the likely significant effects of the Offshore Project will be undertaken through application of the evidence base.

All potential impact pathways related to Fish and Shellfish Ecology will be evaluated using the best available evidence to document any expected activity specific effects resulting from each type of impact. An assessment will be made on the sensitivity of each receptor group to each impact, based on peer-reviewed literature.

Stakeholder consultation will be undertaken at pivotal points throughout the EIA process to ensure that the approach, including the application of the evidence base, satisfies the requirements of both stakeholders and regulators, such as after scoping, prior to commencement, and at the draft production of the chapter during the Offshore EIAR.

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6.6.7. SCOPING QUESTIONS FOR CONSULTEES

Scoping questions for consultees in relation to the Fish and Shellfish Ecology Assessment include:

1. Do you agree that the data sources referenced above to inform the baseline are valid for the purposes of this scoping assessment?
2. Are there any other data sources that should be used to inform the Fish and Shellfish Ecology baseline?
3. Have all Fish and Shellfish Ecology receptors and potential impacts that could result from the Offshore Project been identified?
4. Do you agree with the assessment methodology proposed to be undertaken within the Offshore EIAR?
5. Do you agree that the designed in mitigation measures described provide a suitable means for managing and mitigating the relevant potential effects of the Offshore Project on Fish and Shellfish Ecology receptors?
6. Are there any additional concerns related to Fish and Shellfish Ecology that should be considered within the assessment

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6.7. MARINE MAMMALS AND OTHER MEGAFAUNA

6.7.1. INTRODUCTION

This chapter of the Offshore Scoping Report provides an overview of the baseline environment for Marine Mammals and Other Megafauna within the Array Area and Offshore Cable Corridor Area of Search. It also includes a scoping assessment of likely significant effects for the relevant receptors, from the construction, operation (including maintenance), and decommissioning phases of the Offshore Project.


6.7.2. STUDY AREA

The Marine Mammals and Other Megafauna Study Area has been defined on the basis of the elements of the Offshore Project and focusses on the local marine mammal population, particularly pinnipeds. A separate, secondary Study Area has also been defined: the Wider Marine Mammals and Other Megafauna Study Area (discussed subsequently in this section). The Marine Mammals and Other Megafauna Study Area is defined as the marine environment of the Array Area and Offshore Cable Corridor Area of Search with a 100 km buffer area (see Figure 6.7-1) based on the average foraging range of grey seal *Halichoerus grypus*, as they have the larger foraging range of the two UK resident seal species (SCOS, 2022). Pinnipeds may undertake foraging trips large distances from haul out sites, e.g. 50 km for harbour seal *Phoca vitulina* or 100 km for grey seal (Carter *et al.* 2020). Therefore, using a 100 km buffer is likely to encompass all seals within the region that are likely to directly interact with the Offshore Project.

Cetaceans are highly mobile with vast geographic ranges (Pinn *et al.* 2018). Due to the true Zone of Influence (Zoi) extending beyond the defined borders of the Marine Mammals and Other Megafauna Study Area, this chapter also considers a second study area, defined as the Wider Marine Mammals and Other Megafauna Study Area, defined for each cetacean receptor species separately. The Wider Marine Mammals and Other Megafauna Study Area is defined by the marine mammal Management Units (MUs) for each cetacean receptor species, due to the connectivity of each population within this area. The MUs that define the scale of species-specific Wider Marine Mammals and Other Megafauna Study Areas are listed in Table 6.7-2.

Also considered are the densities and abundances within the Small Cetaceans in European Atlantic waters and the North Sea (SCANS-III and SCANS-IV) survey blocks, and the total counts of individuals within the Offshore Project site-specific digital aerial surveys (DAS) (Array Area plus 10 km buffer), noting that the site-specific DAS were completed monthly until February 2025. Results from the first 12 months (March 2023 to February 2024) were available at the time of writing.

Marine turtles, ocean sunfish *Mola mola*, tuna, and sharks also migrate considerable distances and may be present in low numbers within the Marine Mammals and Other Megafauna Study Area. Basking sharks

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Cetorhinus maximus and turtles are not considered for defining the study area buffers as they are not resident in the area. Therefore, the 100 km buffer zone is considered appropriate for these wide-ranging species.

The scoping design envelope extends to MHWS, meaning impacts from offshore infrastructure are considered for receptors below MHWS (impacts from offshore infrastructure will be considered for receptors above MHWS only where applicable). It should be noted that the topic-specific study area will vary depending on the nature and scale of each receptor, or associated pathway, that could result in a receptor effect.

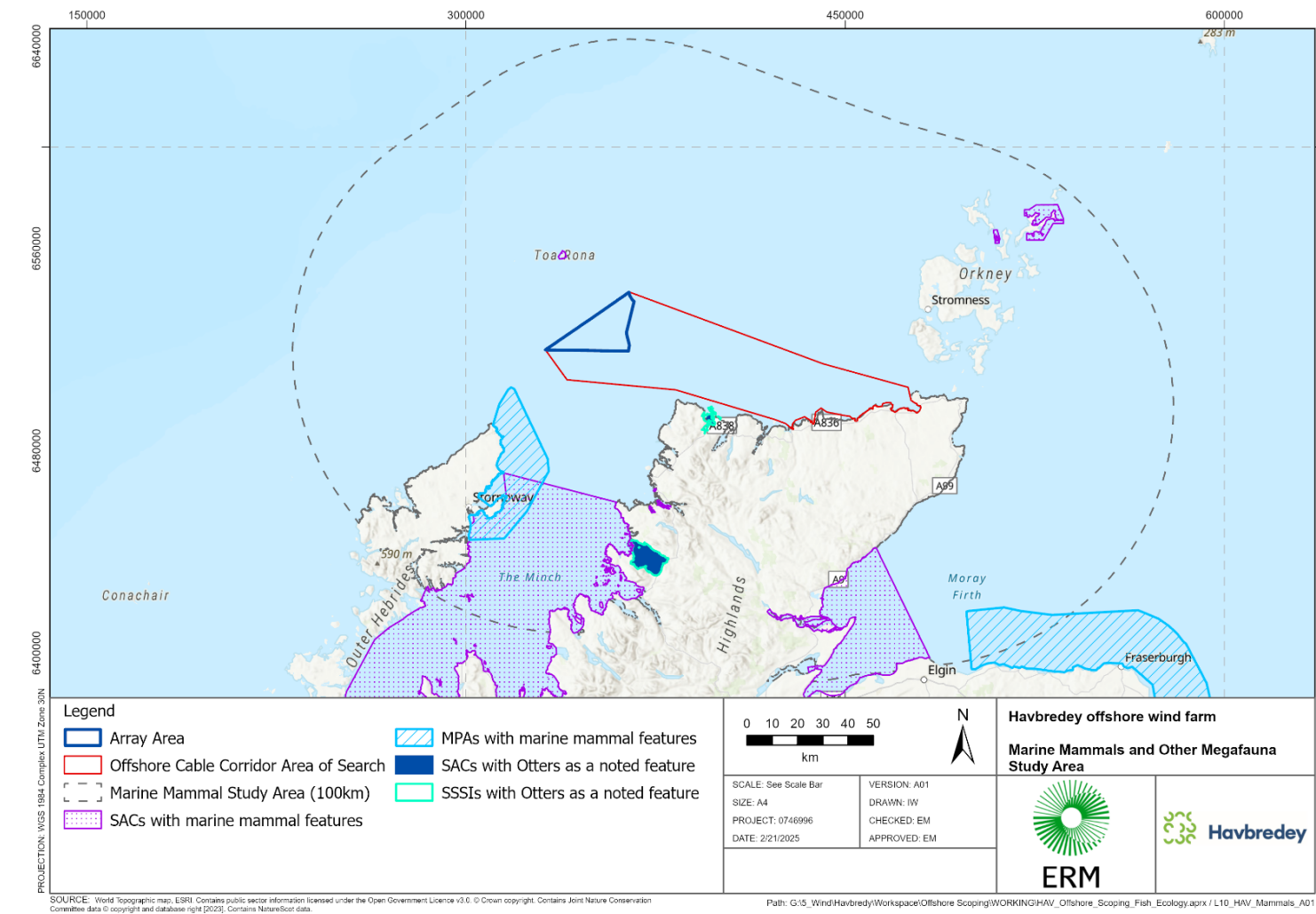



Figure 6.7-1 Marine Mammals and Other Megafauna Study Area

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6.7.3. BASELINE ENVIRONMENT


6.7.3.1. Data Sources

Data sources used to inform this Marine Mammals and Other Megafauna Chapter of the Offshore Scoping Report are presented in Table 6.7-1.


It should also be noted that at the time of writing, some figures are not publicly available. Publicly available figures have been included throughout the report where applicable and available.

Table 6.7-1 Summary of Key Data Sources for Marine Mammals and Other Megafauna


Source	Spatial Coverage	Year	Summary
SCANS-III revised report (Hammond <i>et al.</i> 2021)	The Marine Mammals and Other Megafauna Study Area along with the coastal waters of the UK, the North Sea, English Channel, and part of the Bay of Biscay	2021	This report provides design-based estimates of cetacean abundance for various species, based on a series of extensive surveys in European Atlantic waters
SCANS-III density surface modelling report (Lacey <i>et al.</i> 2022)	European Atlantic Waters	2016	Surveys to provide information at an appropriately wide spatial scale on distribution and abundance of cetaceans
SCANS-IV density surface modelling report (Gilles <i>et al.</i> 2023)	The Marine Mammals and Other Megafauna Study Area and the coastal waters of the rest of the UK, as well as the North Sea, English Channel, and part of the Bay of Biscay	2022	This report expands on previous surveys (SCANS 1994, SCANS-II 2005, SCANS-III 2016) to report changes in abundance and distribution, and describes the density surface modelling for cetacean species for which sufficient data was obtained
WDC – Shorewatch, Scotland	Scottish waters	2005-2025	Citizen science volunteers who are trained and supported by WDC to carry out regular

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Source	Spatial Coverage	Year	Summary
			10 minute surveys from Shorewatch sites across Scotland
Predicting habitat suitability for basking sharks (<i>Cetorhinus maximus</i>) in UK waters using ensemble ecological niche modelling (Austin <i>et al.</i> 2019)	Marine Mammals and Other Megafauna Study Area and wider UK	2019	Ecological Niche Modelling (ENM) to predict habitat suitability for basking shark throughout UK waters
Basking sharks in the northeast Atlantic: Spatio-temporal trends from sightings in UK waters (Witt <i>et al.</i> 2012)	Marine Mammals and Other Megafauna Study Area and wider UK	2012	Spatio-temporal distribution patterns of basking shark analysed from public sightings in UK waters
Offshore Project specific DAS conducted by APEM	The Array Area with 10 km buffer area	2023-2025	These are site-specific DAS carried out by APEM on behalf of the Applicant consisting of 24 monthly surveys. Results from the first 12 months (March 2023 to February 2024) were available at the time of writing
Spiorad na Mara DAS conducted by APEM	Overlaps Marine Mammals and Other Megafauna Study Area	March 2022 – March 2023	These are monthly DAS carried out by APEM for a nearby project.
JNCC Cetacean Atlas (Reid <i>et al.</i> 2003)	Marine Mammals and Other Megafauna Study Area and wider UK	2003	An overview of the distribution of 28 cetacean species in UK waters
JNCC MPA Mapper	UK	2022	Presents and provides data on Scotland's MPAs, SSSIs, and SACs
National Biodiversity Network (NBN) Atlas	Marine Mammals and Other Megafauna Study Area and wider UK	2022	Compilation of biodiversity data on marine species for public access, including data on marine mammals
Hebridean Marine Mammal Atlas	Marine Mammals and Other Megafauna Study	2018	Compilation of 15 years of surveys conducted from boats in the Outer Hebrides, for a wide

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Source	Spatial Coverage	Year	Summary
	Area and wider Outer Hebrides		variety of marine mammals and basking sharks
Marine Information Network (MarLIN)	UK and beyond	2022	This database compiles and reviews scientific evidence on the impacts of human activities and natural factors on marine species and their habitats
Review of MU boundaries for cetaceans in UK waters (IAMMWG, 2023)	Marine Mammals and Other Megafauna Study Area and wider UK	2023	This project outlines Marine Mammal MUs, including their boundaries and estimated population abundance
Scotland's Marine Atlas	Scottish waters	2018	An assessment of the condition of Scotland's seas based on scientific data
Special Committee on Seals (SCOS)	Marine Mammals and Other Megafauna Study Area and wider UK	2022	An evaluation of the state of Scotland's seas based on scientific data
SCOS	Marine Mammals and Other Megafauna Study Area and wider UK	Interim 2023	An evaluation of the state of Scotland's seas based on scientific data
Distribution maps of cetacean and seabird populations in the North-East Atlantic (Waggitt <i>et al.</i> 2019)	Marine Mammals and Other Megafauna Study Area and northeast Atlantic	1980-2019	Cetacean distribution maps derived from survey data
Estimated At-Sea Distribution of Grey and Harbour Seals (Russell <i>et al.</i> 2017)	UK	2017	Geographic Information System (GIS) files showing an updated version of the previous seal usage maps presented in Jones <i>et al.</i> (2015) and represent an estimated average number of seals per 5x5 km cell
Habitat-based predictions of at-sea distribution for grey and	UK	2020	Programme of deployment of Global Positioning System (GPS)

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Source	Spatial Coverage	Year	Summary
harbour seals in the British Isles (Carter <i>et al.</i> 2020)			tags on grey seals around the UK and analysis to estimate at-sea distribution of both seal species, using habitat modelling and data tracking to produce distribution maps
Sympatric Seals, Satellite Tracking and Protected Areas: Habitat-Based Distribution Estimates for Conservation and Management (Carter <i>et al.</i> 2022)	UK and Ireland	2022	GPS tracking dataset and spatial coverage to model habitat preference and generate at-sea distribution estimates for UK and Ireland grey and harbour seal populations
Designated haul-out sites for grey and harbour seals (Protection of Seals Orders) (Marine Scotland, 2019)	Scottish waters	2019	Map layers (NMPI) and GIS files showing 194 seal haul-out sites (where seals rest, moult, or breed) across Scotland
West of Orkney Offshore Wind Farm DAS conducted by HiDef (HiDef, 2023)	Overlaps Marine Mammals and Other Megafauna Study Area	2023	These are DAS carried out by HiDef for West of Orkney Windfarm
Pentland FLOW DAS conducted by HiDef (HiDef, 2015; HiDef, 2016; HiDef, 2021)	Overlaps Marine Mammals and Other Megafauna Study Area	2015, 2016, 2021	These are DAS carried out for Pentland FLOW
HWDT sightings map	Worldwide	2017-2025	An interactive sightings map which shows the latest sightings reported by citizen scientists to help track movements of coastal species
Regional baselines for marine mammal knowledge across the North Sea and Atlantic areas of Scottish Waters (Hague <i>et al.</i> 2020)	Scottish waters	2019	A report which provides up to date information on the abundance and distribution of marine mammal species in Scottish waters
Statistical approaches to aid the identification of MPAs for	Scottish Waters	1994-2012	A report which predicts the relative densities of cetacean and

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Source	Spatial Coverage	Year	Summary
minke whale, Risso’s dolphin, white-beaked dolphin and basking shark (Paxton <i>et al.</i> 2014)			elasmobranch species, to identify regions of high densities of each species with the aim to explain the distributions in relation to relevant environmental variables to inform location of MPAs
Pentland FLOW EIAR	Overlaps Marine Mammals and Other Megafauna Study Area	2022	Description of marine mammals and other megafauna within the Pentland Offshore Wind Farm array area and export cable corridor
West of Orkney Windfarm EIAR	Overlaps Marine Mammals and Other Megafauna Study Area	2023	Description of marine mammals and other megafauna within the West of Orkney Offshore Wind Farm array area and export cable corridor

6.7.3.2. Site-Specific Surveys


To inform the impact assessment, site-specific DAS of the Array Area and a 10 km buffer, as agreed with NatureScot, were commissioned by the Applicant to provide site-specific and up to date ornithological and marine mammal and other megafauna data (both receptor groups are recorded as part of the site-specific DAS). NatureScot advise a buffer of 10 km for site-specific DAS where sensitive species (sea ducks and divers) are likely to be present (NatureScot, 2023a). Surveys commenced in March 2023, and will continue for a total of 24 months. Data from the first year of the site-specific DAS (March 2023 to February 2024) is available to inform this Offshore Scoping Report.

Otters are likely to use many of the habitats on the coast within the vicinity of the Offshore Project. Therefore, protected species surveys focusing particularly on otter at the selected landfall area are expected to be undertaken to inform the EIA.

6.7.3.3. Overview of the Baseline Environment

Supporting this Offshore Scoping Report, an initial desk-based review of literature and available data sources (see Table 6.7-1) has been undertaken; the findings are presented below, to provide an understanding of the baseline environment for Marine Mammals and Other Megafauna.

A range of Marine Mammals and Other Megafauna may be present within the Marine Mammals and Other Megafauna Study Area, including cetaceans (e.g. dolphins, porpoises, and whales) and pinnipeds (e.g. seals),

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lutrinae (e.g. otter) as well as marine megafauna (e.g. basking shark, blue shark *Prionace glauca*, tuna, ocean sunfish, and marine turtles).

Cetaceans

More than 20 cetacean species can be found in Scottish waters (NatureScot, 2023b). Whale, dolphin and porpoise species are frequently recorded in the waters off the northwest and north coast of Scotland, over to the Northern Isles, the most common species include:


- Harbour porpoise *Phocoena phocoena*
- White-beaked dolphin *Lagenorhynchus albirostris*
- Orca *Orcinus orca*
- Risso's dolphin *Grampus griseus*
- Short-beaked common dolphin *Delphinus delphis*
- Minke whale *Balaenoptera acutorostrata*
- Bottlenose dolphin *Tursiops truncatus* (NatureScot, 2023b)

Other species potentially present include:

- Fin whale *Balaenoptera physalus* (HWDT, 2025a)
- Long-finned pilot whale *Globicephala melas* (HWDT, 2024a)
- Humpback whale *Megaptera novaeangliae* (HWDT, 2024b)
- Cuvier's beaked whale *Ziphius cavirostris* (HWDT, 2025b)

All cetacean species are protected as EPS under Annex IV of the EU Habitats Directive (Directive 92/43/EEC), which is enforced through legislation that prohibits deliberate harm, disturbance or capture. Annex II of the EU Habitats Directive (Directive 92/43/ECC) requires Member States to designate, protect and manage SACs for the protection of cetaceans listed within the annex. Cetacean species are further protected under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland) and Marine (Scotland) Act 2010. Additional international agreements such as the Convention on the Conservation of Migratory Species also enforce protection for migratory species, such as the minke whale, which is listed in Appendix II.

Among the species listed above, harbour porpoise, Risso's dolphin, and, to a lesser extent, white-beaked and bottlenose dolphin can be found throughout the year (HWDT, 2025c). In contrast, other species exhibit more seasonal patterns. Minke whale and short-beaked common dolphin are more commonly encountered during the summer months. Orcas may be present year-round and can be seen in coastal waters off the west coast of Scotland, over to the Orkney and Shetland Islands (NatureScot, 2023c). A small pod of 8

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individuals, named ‘The West Coast Community’, has been sighted in the Inner Hebrides and The Little Minch, while another pod, named ‘The Northern Isles Community’, are commonly sighted from the north coast and the Northern Isles, and frequently travel to Norway (The Wildlife Trusts, 2024a). The most recent sightings of orca were off the coast of Clach toll on 9th February 2025 and off of Dunnet Head on the 16th February 2025 (Waggitt *et al.* 2019; HWDT, 2025c).

Other cetacean species may have the potential to be present, due to historical sightings in the area, but are not considered resident species and are unlikely to be encountered at high densities. Long-finned pilot whale can be found in waters around Scotland, including the Outer Hebrides and other coastal areas of northwest and north Scotland, with peak sightings during warmer months (HWDT, 2024a; HWDT, 2025c). Sightings of long-finned pilot whale in the Hebrides are scattered, and they are mostly restricted to the deep waters of the north Atlantic Ocean, the North Sea and the western Mediterranean in the Northern hemisphere (HWDT, 2024a). Humpback whales are increasingly being sighted in the wider region, with sightings reported mainly in summer months off Dunnet, as well as throughout The Minch and the Inner Hebrides (Risch *et al.* 2019; van Geel, *et al.* 2022; HWDT, 2024b).

Additionally, Scotland represents the northern-most limit for Cuvier’s beaked whale, so sightings are very rare, however other data sources suggest abundance may be higher than sightings data (HWDT, 2025b). Cuvier’s beaked whales are known to be deep divers, where they will feed deep in the water column (Baird, 2018; Shearer *et al.* 2019). Fin whale sightings in the Hebrides occur very rarely and generally occur in warmer summer months, suggesting fin whales move inshore to take advantage of rich food resources such as herring, mackerel and cod, squid, as well as krill (HWDT, 2025a). The distribution of pilot whale in SCANS-IV 2022 is similar to data found in SCANS-III 2016 and SCANS-II, however the abundance estimate has decreased (Gilles *et al.* 2023).

Several surveys relevant to the Offshore Project have been conducted, including:

- DAS for West of Orkney Offshore Wind Farm over a period from July 2020 to June 2022 (HiDef, 2023)
- DAS for Pentland FLOW (HiDef, 2015; HiDef, 2016; HiDef, 2021)
- DAS for Spiorad na Mara (commenced March 2022)
- SCANS-III aerial and shipboard surveys (Lacey *et al.* 2022)
- SCANS-IV aerial and shipboard surveys (Gilles *et al.* 2023)
- Abundance estimates for the relevant MUs (IAMMWG, 2023)
- Offshore Project site-specific DAS over twelve months (March 2023 – February 2024), providing site-specific survey counts (APEM, 2024)

Results from these surveys are presented in Table 6.7-2.



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Table 6.7-2 Abundance and Density of Cetaceans in Vicinity of the Offshore Project

Species	Offshore Project site-specific DAS total count (March 2023-February 2024) (APEM, 2024)	Spiorad na Mara DAS total count (March 2022 – February 2023)	DAS for West of Orkney Windfarm (HiDef, 2023)		DAS for Pentland FLOW (HiDef, 2015; HiDef, 2016; HiDef, 2021)			Density (animals/km ² ; Gilles et al. 2023)		Abundance and MU (IAMMWG, 2023)
			July 2020 – June 2021	July 2021 – June 2022	2015	2016	2021*	Block CS-H	Block CS-J	
Common dolphin <i>D. delphis</i>	112	47	12	30	0	0	3	Density: 0.9266 Abundance: 12,958	Density: 0 Abundance: 0	Celtic and Greater North Seas (CGNS) MU 102,656 (UK section 57,417)
Harbour porpoise <i>P. phocoena</i>	90	61	46	78	3	12	24	Density: 0.3911 Abundance: 5,470	Density: 0.0994 Abundance: 3,231	West Scotland: 28,936 (UK section 24,305)
White-beaked dolphin <i>L. albirostris</i>	48	0	8	88	15	14	0	Density: 0.1380 Abundance: 1,930	Density: 0.2565 Abundance: 8,335	CGNS: 43,951 (UK section 34,025)
Bottlenose dolphin <i>T. truncatus</i>	0	1	1	0	0	0	0	Density: 0.3421 Abundance: 4,784	Density: 0 Abundance: 0	Coastal West Scotland & Hebrides (CWSH): unknown (UK section 45)
Risso's dolphin <i>G. griseus</i>	27	16	13	7	3	0	0	Density: 0.0244 Abundance: 341	Density: 0.0288 Abundance: 936	CGNS: 12,262 (UK section 8,687)
Atlantic white-sided dolphin <i>Lagenorhynchus acutus</i>	0	0	0	0	0	0	0	Density: 0.0279 Abundance: 390	Density: 0.0233 Abundance: 756	CGNS: 18,128 (UK section 12,293)

Species	Offshore Project site-specific DAS total count (March 2023-February 2024) (APEM, 2024)	Spiorad na Mara DAS total count (March 2022 – February 2023)	DAS for West of Orkney Windfarm (HiDef, 2023)		DAS for Pentland FLOW (HiDef, 2015; HiDef, 2016; HiDef, 2021)			Density (animals/km ² ; Gilles et al. 2023)		Abundance and MU (IAMMWG, 2023)
			July 2020 – June 2021	July 2021 – June 2022	2015	2016	2021*	Block CS-H	Block CS-J	
Minke whale <i>B. acutorostrata</i>	4	1	2	1	0	0	0	Density: 0.0353 Abundance: 493	Density: 0.0221 Abundance: 493	CGNS: 20,118 (UK section 10,288)
Beaked whale (all species)	0	0	0	0	0	0	0	Density: 0.0034 Abundance: 47	N/A	N/A

Note: (*) includes a record of one unidentified cetacean species.

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Pinnipeds

Two species of pinniped are considered resident in UK waters: the harbour seal and the grey seal. The Offshore Cable Corridor Area of Search overlaps the inshore waters adjacent to the Loch Eriboll & Whiten Head seal haul-out site, located on the north coast of Scotland, designated for grey seal. Other nearby seal haul-out areas within close proximity to the Array Area and Offshore Cable Corridor Area of Search include (see Figure 6.7-2):

- Am Balg, located northwest coast of Scotland, designated for grey seal
- Sgeir Leathann (Broad Bay), located northeast Isle of Lewis, designated for harbour and grey seal
- Rubha Creag Iomhair, located west coast of Scotland, designated for harbour seal
- Eilean Chrona, located west coast of Scotland, designated for grey seal
- Eilean Hoan, located north coast of Scotland, designated for harbour and grey seal
- Kyle of Tongue Sandbanks, located north coast of Scotland, designated for harbour and grey seal
- Eilean nan Ron (Tongue), located north coast of Scotland, designated for breeding grey seal
- Sule Skerry, located 60 km offshore of the north coast of Scotland, designated for breeding grey seal

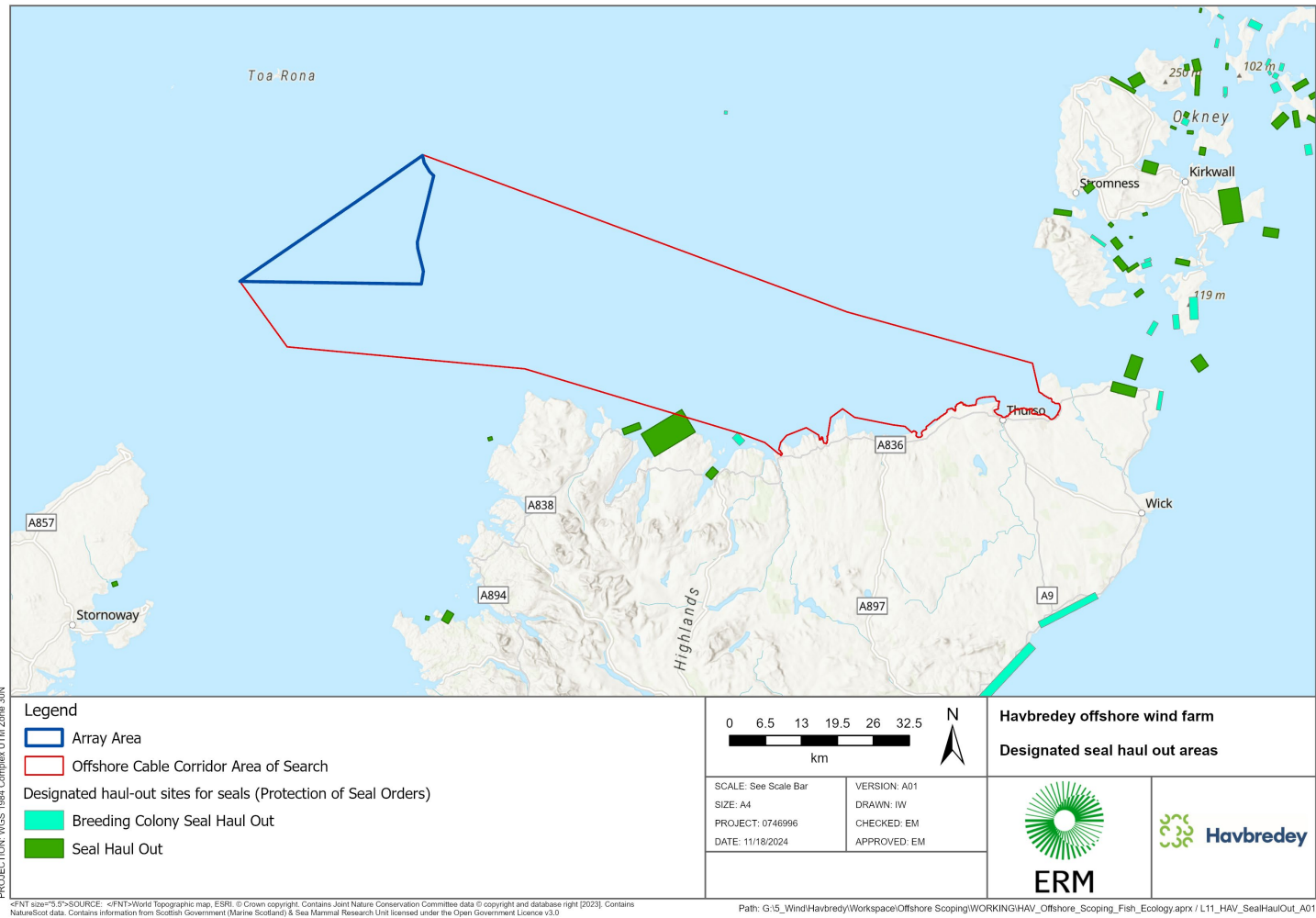



Figure 6.7-2 Seal Haul-out Areas in the Vicinity of the Offshore Project (Marine Scotland, 2019)


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The North Rona SAC is located approximately 26 km north of the Array Area and is designated for grey seal. There are no SACs designated for harbour seal within the Offshore Project, with the closest (Sound of Barra SAC) located 196.8 km from the Array Area. Offshore Project site-specific DAS detected 10 grey seal and six unidentified seal species within the Array Area, including the 10 km buffer (APEM, 2024).

Grey seal, an Annex II species under the Habitats Directive (Council Directive 92/43/EEC), are widely distributed across Scottish waters. Within the wider area surrounding the Offshore Project, colonies with particularly high densities are found among the Orkney Islands (SCOS, 2022). Grey seal breeding season occurs in the autumn, with the nearest breeding colonies to the Offshore Project located within North Rona SAC and Faray and Holm of Faray SAC, situated approximately 26 km and 67 km away respectively. The North Rona SAC falls within the Western Isles Seal Management Unit (SMU), which extends to the southwest away from the Offshore Project (SCOS, 2022). Faray and Holm of Faray SAC is located within the North Coast and Orkney SMU.

Monitoring seal population spatial and temporal trends and overall abundance is mostly focussed on land rather than at sea, due to large range distances and time spent underwater (SCOS, 2024). Grey seal pup production in the Western Isles SMU of Scotland has been constant for over 20 years, although pup production within North Rona SAC appears to be declining (SCOS, 2022). Pup production in the North Coast and Orkney SMU increased from 1985 to 2000, however it has since stabilised and has not increased further. Conversely, the Faray and Holm of Faray SAC has been steadily declining since around 2000. Grey seal predominantly forage offshore at depths of less than 100 m, and their foraging range can extend beyond 100 km (SCOS, 2024), feeding mainly on demersal fish species (Thompson *et al.* 1996; Carter *et al.* 2022). Haul-out sites designated for grey seal were recorded in nearby coastal areas off the north and west coasts of Scotland and the Northern Isles (EMODnet, 2024) and prefer to haul-out in exposed areas (NatureScot, 2024). Across UK waters, the most recent estimate of the grey seal population is 162,000 with Scotland accounting for 129,100 of the total (SCOS, 2022).

Harbour seal are also an Annex II species under the Habitats Directive (Council Directive 92/43/EEC) and found throughout the waters of the west coast of Scotland, throughout the Hebrides and the Northern Isles, but are largely absent from the north coast of mainland Scotland (NatureScot, 2024). These seals typically forage between 40-50 km from haul-out sites, feeding on a range of prey including cephalopods and fish (Thompson *et al.* 1996). Harbour seal pupping occurs from June to July, with moulting usually taking place in August, during which time they remain closer to shore. The August surveys are the main monitoring method for monitoring harbour seals during the moult, when a high and relatively consistent proportion are hauled out (SCOS, 2024). The nearest breeding colonies to the Offshore Project are those found in the Sanday SAC, approximately 75 km away. The Sanday SAC is located within the North Coast and Orkney SMU. Harbour seal pup production in this area is in decline, both within the Sanday SAC and within

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the wider SMU. Haul-out sites designated for harbour seal were recorded in nearby coastal areas off the north and west coasts of Scotland and the Northern Isles (EMODnet, 2024), aligning with existing literature that suggests harbour seal prefer sheltered areas over the exposed coastline close to the Offshore Project (Jones *et al.* 2015; Arias-del-Razo *et al.* 2016). Harbour seal populations in the North Coast & Orkney population appears to be in decline and the Shetland population is stable at a depleted level after recent declines (SCOS, 2022). The most recent harbour seal population estimate was 42,900 for the total UK and 36,600 for Scotland (SCOS, 2022).

Lutrinae

Eurasian Otter *Lutra lutra* live in both freshwater and coastal seawater and are recorded in the west and north coast of Scotland and in the Northern Isles (Findlay *et al.* 2015; NBN atlas, 2023). [Redacted]


Marine areas can provide increased prey availability, however access to inland habitats must be maintained as freshwater is used for consumption and washing (Kruuk, 2006; Parry *et al.* 2011). As such, otters are likely to use many of the habitats on the coast in close proximity to the Landfall Area of Search.

Otters and their holts are protected in the UK as an EPS, under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and under the Wildlife and Countryside Act (1981).

Other Megafauna (*Basking Sharks, Marine Turtles and Ocean Sunfish*)

Basking sharks, protected under the Wildlife and Countryside Act 1981 (as amended) in Scotland, have a distribution that overlaps with the Marine Mammals and Other Megafauna Study Area, although they are seen infrequently, with higher densities occurring further south, particularly between Coll and Tiree and to the west of Mull, due to greater plankton availability. Boat surveys conducted by the HWDT (SV Silurian) over a 15-year period recorded few sightings of basking sharks in coastal waters of northwest Scotland and the Hebrides overlapping the Marine Mammals and Other Megafauna Study Area. The maximum sighting per unit effort (km) recorded was 0.520 off the northwest coast of Lewis, with a maximum of 0.015 within the section of The Minch overlapping the Marine Mammals and Other Megafauna Study Area (HWDT, 2018). In a survey for the Lewis Wave Array, eight individual basking shark sightings were recorded on six days between May and August over one year (Royal Haskoning, 2012), with feeding behaviour observed in half of these cases. For the West of Orkney DAS, five individuals were recorded, three individuals between March and October 2021, and two individuals between June and September 2022 (HiDef, 2023). During the Offshore Project site-specific DAS, one basking shark was recorded in October 2023 (APEM, 2024).


Records also indicate the presence of four marine turtle species in Scottish waters, primarily during summer: leatherback *Dermochelys coriacea*, loggerhead *Caretta caretta*, Kemp's ridley *Lepidochelys kempii*, and green *Chelonia mydas*. All four species are protected under UK law as EPS and listed in Annex IV of the EU

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Habitats Directive (Directive 92/43/EEC), as well as on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland) and the Wildlife and Countryside Act 1981. Leatherback and loggerhead turtles are also included in the OSPAR List of Threatened and/or Declining Species and Habitats. Between 1989 and 2011, 156 turtle sightings were reported (Scotland’s Marine Atlas, 2011), but overall records from 1750 to 2014 include around 350 records of turtle in Scottish waters (O’Reilly *et al.* 2022). Leatherback turtles are the most sighted, accounting for 11 of 12 live sightings in UK waters in 2021, including four in Scottish waters. These turtles are believed to forage on jellyfish in the region. The presence of other turtle species is likely due to disorientation or accidental transportation via ocean currents. As such, marine turtles are considered extremely rare within the Marine Mammals and Other Megafauna Study Area.

The blue shark and Atlantic bluefin tuna *Thunnus thynnus* are two migratory species that can be found in Scottish waters, particularly in summer months. Blue shark can be found in waters off the west coast of Scotland in the summer months due to their annual trans-Atlantic migrations (Scottish Government, 2011; Marine Conservation Society, 2024). Two blue sharks were recorded during the site-specific DAS surveys (APEM, 2024). Similarly, Atlantic bluefin tuna are a highly migratory fish that can be found off the Scottish coast, and off the eastern, southern and south-western coasts of the British Isles and western Ireland as numbers are increasing (The Wildlife Trusts, 2024b). The site-specific DAS surveys recorded 171 Atlantic bluefin tuna (APEM, 2024). Other large sharks, such as the porbeagle shark *Lamna nasus*, may also be present in the Marine Mammals and Other Megafauna Study Area as found within West of Orkney DAS.

Ocean sunfish are globally distributed across temperate and tropical seas but are rarely recorded in Scottish waters. Sightings have been reported along the Scottish and Irish coasts, as well as the south and west coasts of England, and even in the Baltic Sea (Bleach, 2002; Hinrichsen *et al.* 2022) and four sightings recorded in site-specific DAS surveys (APEM, 2024). Although their frequency in northern waters appears to be increasing (Rogan and Mackey, 2007), they remain rare and seasonal, as winter temperatures in these regions fall below their thermal tolerance. In Scottish waters, sightings of ocean sunfish are typically solitary, although they occur in greater numbers in other regions (Cartamil and Lowe, 2004). Aerial surveys in the Irish Sea, covering 11,951 km² between 2003 and 2004, detected 68 individuals (Houghton *et al.* 2006). This suggests that sunfish may be more common than previously thought and may be more abundant than other rare seasonal species such as leatherback turtles. However, density remains lower in the northern Irish Sea compared with St George’s Channel and the Bristol Channel, a pattern likely extending into Scottish waters. To date, Offshore Project site-specific DAS surveys (March 2023 to February 2024) have recorded 34 ocean sunfish (APEM, 2024). Ocean sunfish are not covered by any conservation measures in the UK or under the EU Habitats Directive but are vulnerable to human activities such as entanglement and ship strikes. They are listed as Vulnerable on the IUCN Red List of Threatened Species (Liu *et al.* 2015).

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Protected Areas


Protected areas in Scotland are divided into NCMPAs, SACs, SPAs, SSSIs, and Ramsar sites. Of these, SACs and NCMPAs are of direct relevance to marine mammals and other megafauna. SACs are designated internationally under the EU Habitats Directive (92/43/ECC) for the protection of marine species and habitats determined to contribute to conservation of Europe’s biodiversity. There are currently 16 SACs for marine mammals (1 for harbour porpoise, 1 for common bottlenose dolphin, 8 for harbour seal, and 6 for grey seal) in Scottish waters. NCMPAs, in comparison, add additional protection and serve to fill in any gaps not protected by SACs. SACs, SSSIs and NCMPAs within the Marine Mammals and Other Megafauna Study Area are presented in Figure 6.7-1 and are listed in Table 6.7-3.

Protected areas help maintain healthy ecosystems for cetacean species by reducing the impacts of human activities such as fishing, shipping, and offshore development, (Carlucci, *et al.* 2021). Protected areas also create refuges for highly mobile species with extensive ranges (e.g. whales, dolphins, and porpoises) where human pressures are minimised, promoting the recovery and sustainability of these populations (Roberts and Hawkins, 2000; Pomeroy *et al.* 2004; Marcos *et al.* 2021). Protected areas are particularly significant in regions like the Inner and Outer Hebrides, where a diverse range of cetacean species rely on the rich marine environment.

The closest SAC to the Offshore Project with otters as a designated feature is Durness SAC, approximately 2 km south of the Offshore Cable Corridor Area of Search. The closest SAC with (non-otter) marine mammal designated features to the Offshore Project is the North Rona SAC (designated for grey seal), approximately 26 km north of the Array Area. The closest NCMPA is North-east Lewis, which lists Risso’s dolphin as a feature, and is approximately 19 km south of the Array Area.

Table 6.7-3 Protected Areas Designated for Marine Mammal Features Within the Marine Mammals and Other Megafauna Study Area

Site Name	Designation	Relevant Protected Feature	Distance from Offshore Project (km)	Direction from Array Area
Durness	SAC	Otter	2	South
Durness	SSSI	Otter	2	South
North-east Lewis	NCMPA	Risso’s dolphin	19	South
North Rona	SAC	Grey seal	26	North
Ardvar and Loch a' Mhuilinn Woodlands	SAC	Otter	40	South
Inner Hebrides and the Minches	SAC	Harbour porpoise	42	South

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Site Name	Designation	Relevant Protected Feature	Distance from Offshore Project (km)	Direction from Array Area
Moray Firth	SAC	Bottlenose dolphin	51	Southeast
Inverpolly	SAC	Otter	61	South
Inverpolly	SSSI	Otter	61	South
Faray and Holm of Faray	SAC	Grey seal	67	Northeast
Dornoch Firth and Morrich More	SAC	Harbour seal Otter	72	Southeast
Sanday	SAC	Harbour seal	75	Northeast
Southern Trench	NCMPA	Minke whale	81	Southeast

6.7.4. DESIGNED IN MITIGATION

The designed in mitigation relevant to the Marine Mammals and Other Megafauna assessment, which have been incorporated into the current design of the Offshore Project, is outlined below in Table 6.7-4.

Table 6.7-4 Marine Mammals and Other Megafauna Designed In Mitigation Measures

ID	Designed In Mitigation Measure	How the measure will be secured
ID003	A CEMP and PEMP will be developed prior to construction and adhered to in compliance with legislative requirements and best practice standards and guidance. requirements and best practice standards and guidance.	Secured under Section 36 and/or Marine Licence consent conditions.
ID004	Measures to mitigate underwater noise and collision risk will be outlined in a MMMP. The MMMP will be developed before construction begins and will take into consideration relevant JNCC guidance on noise impacts, the Scottish Marine Wildlife Watching Code, and use of prescribed routes and set transit speeds where possible.	Secured under Section 36 and/or Marine Licence consent conditions.
ID006	The Project will adhere to requirements of relevant international conventions, including MARPOL 73/78.	Secured under Section 36 and/or Marine Licence consent conditions.


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ID	Designed In Mitigation Measure	How the measure will be secured
ID007	Best practice techniques will be employed through all phases of the Project, and measures will be provided in a MPCP, which will form part of the CEMP and PEMP. SOPEPs will be developed for the Project prior to construction.	Secured under Section 36 and/or Marine Licence consent conditions.
ID012	As part of scheduled maintenance mooring lines and cables will undergo regular inspection. In the event discarded fishing gear is found entangled in these lines/cables a risk-based assessment will be carried out to determine if the fishing gear requires removal.	Secured under Section 36 and/or Marine Licence consent conditions.

6.7.5. SUMMARY OF KEY RECEPTORS, SENSITIVITIES AND LIKELY SIGNIFICANT EFFECTS

The key receptors for Marine Mammals and Other Megafauna are:

- Cetaceans
 - Harbour porpoise
 - White-beaked dolphin
 - Orca
 - Risso’s dolphin
 - Short-beaked common dolphin
 - Minke whale
 - Bottlenose dolphin
 - Fin whale
 - Long-finned pilot whale
 - Humpback whale
 - Cuvier’s beaked whale
- Pinnipeds
 - Grey seal
 - Harbour seal
- Lutrinae
 - Eurasian otter
- Other Megafauna
 - Basking shark
 - Blue shark
 - Atlantic bluefin tuna

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- Ocean sunfish
- Leatherback turtle
- Loggerhead turtle
- Kemp’s ridley turtle
- Green turtle

6.7.5.1. Likely Significant Effects

The scoping of likely significant effects on Marine Mammals and Other Megafauna receptors which may arise within the Marine Mammals and Other Megafauna Study Area via the Offshore Project, is outlined in Table 6.7-5.




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Table 6.7-5 EIA Scoping Assessment for Marine Mammals and Other Megafauna


Potential Impact	Scoping Result	Justification	Assessment Method
Construction and Decommissioning			
Indirect effects resulting from impacts on prey species (e.g., underwater noise)	In	Physical impacts on prey species and their associated habitat may cause change in abundance of prey availability, which could have energetic impacts on Marine Mammals and Other Megafauna that forage within the vicinity of the Offshore Project.	Desk-based assessment of impacts to prey species (refer to Chapter 6.5: Benthic and Intertidal Ecology and Chapter 6.6: Fish and Shellfish Ecology receptors), mainly informed by outcomes of the corresponding assessments.
Direct effects from noise generated by vessel movements, cable installation, and other noise-generating activities	In	Activities associated with the Offshore Project such as vessel movements or placement of cable protection will produce non-impulsive underwater noise, which has the potential to impact Marine Mammals and Other Megafauna species.	A desk-based assessment drawing on existing literature and reviews regarding mammal sensitivity to vessel presence and underwater noise, alongside Offshore Project-specific survey data and underwater noise modelling, as outlined in Chapter 6.2: Underwater Noise.
Direct effects from noise generated through installation of WTG moorings (e.g., piling)	In	Activities associated with construction of the Offshore Project such as installation of WTG moorings will produce underwater noise, which has the potential to impact Marine Mammals and Other Megafaunal species.	A desk-based assessment drawing on existing literature and reviews regarding mammal sensitivity to vessel presence and underwater noise, alongside Offshore Project-specific survey data and underwater noise modelling, as outlined in Chapter 6.2: Underwater Noise.

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Potential Impact	Scoping Result	Justification	Assessment Method
Direct effects from noise generated through ROV surveys and/or pre-construction geophysical/geotechnical surveys	In	Activities associated with construction of the Offshore Project such as pre-construction geophysical and geotechnical surveys will produce underwater noise, which has the potential to impact Marine Mammals and Other Megafauna receptors.	A desk-based assessment drawing on existing literature and reviews regarding mammal sensitivity to vessel presence and underwater noise, alongside Offshore Project-specific survey data and underwater noise modelling, as outlined in Chapter 6.2: Underwater Noise.
Risk of injury from collision with vessels	In	Marine Mammals and Other Megafauna are susceptible to ship strikes from vessels associated with Offshore Project activities. However, the vessels associated with the Offshore Project will follow prescribed routes and set transit speeds to reduce the probability of collision. Construction works will follow relevant guidance to minimise the risks of injury.	A desk-based assessment using applicable literature and Offshore Project specific vessel presence and activity data.
Disturbance or temporary habitat loss due to the physical presence of vessels	In	Temporary habitat loss, such as the disruption of foraging areas or migration routes may arise due to the presence of infrastructure or vessels in the area. The scale of disturbance/habitat loss will depend on the extent and duration of vessel presence.	A desk-based assessment using applicable literature and Offshore Project specific vessel presence and activity data.
Accidental release of pollutants	Out	Accidental spills of pollutants from equipment used during the Offshore Project activities could harm	N/A

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Potential Impact	Scoping Result	Justification	Assessment Method
		Marine Mammal and Other Megafauna populations. However, an environmental management plan, such as a CEMP, will be in place to follow best practices and requirements outlined by MARPOL and SOPEPs. This will help reduce the risk and minimise the impact of any accidental pollutant release from vessels and equipment during these activities. Therefore, this impact has been scoped out of the Offshore EIAR.	
Primary and secondary entanglement from construction of infrastructure, including static inter-array cables and dynamic cales in the water column	Out	Primary and secondary entanglement of Marine Mammal and Other Megafauna receptors upon encountering infrastructure is unlikely given the size and physical characteristics of static inter-array cables, dynamic cables and mooring systems. Therefore, this impact has been scoped out from the Offshore EIAR.	N/A
Increases in SSC and a reduction in water quality	In	Reductions in water quality or increases in suspended sediments due to Offshore Project activities, such as WTG anchor moorings or cable installation, may affect foraging success or harm prey species populations within the Marine Mammals and Other Megafauna Study Area, indirectly impacting	A desktop review of appropriate literature and additional factors identified within Chapter 6.1: Physical and Coastal Processes and Chapter 6.4: Marine Sediment, Water Quality and Water Framework Directive.

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Potential Impact	Scoping Result	Justification	Assessment Method
		Marine Mammals and Other Megafauna receptors. The timing and scale of direct seabed habitat disturbance associated with construction and decommissioning will determine the significance of this impact.	
Noise generated from clearance of UXO	In	The clearance of any UXO within the Array Area and the Offshore Cable Corridor Area of Search, whether through detonation or other methods (such as deflagration), will generate underwater noise that has the potential to affect Marine Mammals and Other Megafauna species.	A desk-based assessment drawing on existing literature and reviews regarding mammal sensitivity to underwater noise from UXO detonation/deflagration, alongside Offshore Project-specific survey data and underwater noise modelling, as outlined in Chapter 6.2: Underwater Noise.
Barrier effects due to the presence of infrastructure in the water column and on the seabed	In	Presence of the Offshore Project infrastructure may create barrier effects from WTGs, potentially hindering the movement of Marine Mammals and Other Megafauna.	A desk-based review of literature relevant to marine mammal foraging behaviours and movements will be used for the assessment, alongside Offshore Project site-specific DAS data.
Operations and Maintenance			
Indirect effects resulting from impacts on prey species (e.g., underwater noise)	In	Physical impacts on prey species and their associated habitat may cause change in abundance of prey availability, which could have energetic impacts on	Desk-based assessment of impacts to prey species (refer to Chapter 6.5: Benthic and Intertidal Ecology and Chapter 6.6: Fish and

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Potential Impact	Scoping Result	Justification	Assessment Method
		Marine Mammals and Other Megafauna that forage within the vicinity of the Offshore Project.	Shellfish), mainly informed by outcomes of the corresponding assessments.
Direct effects from noise generated by vessel movements, cable maintenance, and other noise-generating activities	In	Activities associated with the Offshore Project such as vessel movements or placement of cable maintenance will produce non-impulsive underwater noise, which has the potential to impact Marine Mammals and Other Megafauna species.	A desk-based assessment drawing on existing literature and reviews regarding mammal sensitivity to vessel presence and underwater noise, alongside Offshore Project-specific survey data and underwater noise modelling, as outlined in Chapter 6.2: Underwater Noise.
Direct effects from noise generated by operational WTGs	In	Any effects on Marine Mammal and Other Megafauna receptors are likely to be minimal as noise generated from operational WTGs is likely to be at low levels and significantly lower than noise generated during construction, however scoped in as a precautionary measure.	A desk-based assessment drawing on existing literature and reviews regarding mammal sensitivity to underwater noise generated by operational WTGs, alongside Offshore Project-specific survey data, as outlined in Chapter 6.2: Underwater Noise.
Risk of injury from collision with vessels	In	Marine Mammals and Other Megafauna are susceptible to ship strikes from vessels associated with Offshore Project activities. However, the vessels associated with the Offshore Project will follow prescribed routes and set transit speeds to reduce the probability of collision. O&M works will follow relevant guidance to minimise the risks of injury.	A desk-based assessment using applicable literature and Offshore Project specific vessel presence and activity data.

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Potential Impact	Scoping Result	Justification	Assessment Method
Disturbance or temporary habitat loss due to the physical presence of vessels	In	Temporary habitat loss, such as the disruption of foraging areas or migration routes may arise due to the presence of infrastructure or vessels in the area. The scale of disturbance/habitat loss will depend on the extent and duration of vessel presence.	A desk-based assessment using applicable literature and Offshore Project specific vessel presence and activity data.
Accidental release of pollutants	Out	Accidental spills of pollutants from equipment used during the Offshore Project activities could harm Marine Mammal and Other Megafauna populations. However, an environmental management plan, such as a PEMP, will be in place to follow best practices and requirements outlined by MARPOL and SOPEPs. This will help reduce the risk and minimise the impact of any accidental pollutant release from vessels and equipment during these activities. Therefore, this impact has been scoped out of the Offshore EIAR.	N/A
Primary entanglement from presence of infrastructure, including static inter-array cables and dynamic cables in the water column	Out	Primary entanglement of Marine Mammal and Other Megafauna receptors upon encountering infrastructure is unlikely given the size and physical characteristics of static inter-array cables, dynamic cables and mooring systems. Therefore, this impact has been scoped out from the Offshore EIAR.	N/A

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Potential Impact	Scoping Result	Justification	Assessment Method
Secondary entanglement due to fishing gear entangled/snagged by infrastructure	In	The Offshore Project may act as a barrier to lost mobile fishing gear, and result in snagging throughout the water column and on the seabed, especially on mooring lines and dynamic cables, within the Array Area. Lost fishing gear is known to cause secondary entanglement (i.e., passive or ghost fishing) and could pose a secondary entanglement risk during the operational and maintenance phase for Marine Mammals and Other Megafauna receptors.	A desktop review of appropriate literature, alongside baseline knowledge of gear types used within the area as identified within Chapter 6.10: Commercial Fisheries, as well as the PDE.
Increases in SSC and a reduction in water quality	In	Reductions in water quality or increases in suspended sediments due to Offshore Project activities, such as WTG anchor moorings or cable maintenance, may affect foraging success or harm prey species populations within the Marine Mammals and Other Megafauna Study Area, indirectly impacting Marine Mammals and Other Megafauna receptors. The timing and scale of direct seabed habitat disturbance associated with operation and maintenance will determine the significance of this impact.	A desktop review of appropriate literature and additional factors identified within Chapter 6.1: Physical and Coastal Processes and Chapter 6.4: Marine Sediment, Water Quality and Water Framework Directive.

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Potential Impact	Scoping Result	Justification	Assessment Method
Barrier effects due to the presence of infrastructure in the water column and on the seabed	In	Permanent presence of physical Offshore Project infrastructure may create barrier effects from WTG mooring lines and dynamic cables potentially hindering the movement of Marine Mammals and Other Megafauna.	A desk-based review of literature relevant to marine mammal foraging behaviours and movements will be used for the assessment, alongside Offshore Project site-specific DAS data.
EMFs associated with subsea cables	In	The EMFs produced by the export cables within the Offshore Cable Corridor Area of Search will be at low levels and will be further reduced due to the cables being largely buried or protected. Within the Array Area, the static and dynamic inter array cables will also produce EMF, therefore this impact is scoped in.	A desktop review utilising literature specific to EMF effects on Marine Mammal and Other Megafauna receptors, alongside the PDE to inform the qualitative assessment.
Long term habitat change due to infrastructure or modifications to seabed, including change in foraging opportunities	In	Permanent presence of physical Offshore Project infrastructure can displace Marine Mammals and Other Megafauna from the Offshore Project. This can reduce the amount of available foraging opportunities.	A desk-based review of literature relevant to marine mammal foraging behaviours and movements will be used for the assessment, alongside Offshore Project site-specific DAS data.

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6.7.6. PROPOSED APPROACH TO EIA

6.7.6.1. Relevant Data Sources

Data sources listed within Table 6.7-1 alongside further secondary data sources including published and unpublished papers, journals and reports will be used to inform the EIA. These sources may be further supplemented by any additional material identified during stakeholder consultation.

In addition to the data sources highlighted in Table 6.7-1, this will be enhanced by additional desktop research of relevant peer-reviewed publications and government reports, as well as any information or data gathered through the consultation process. Protected species surveys, focusing particularly on otter will be undertaken to inform the EIA.

Site-specific surveys will also supplement the desk-based sources, where available. Data from these surveys, such as the second year of site-specific DAS (March 2024 – February 2025), will enable the Marine Mammals and Other Megafauna Study Area to be characterised for EIA purposes and will also inform the assessment.

6.7.6.2. Consultation

Consultation and engagement will be key to confirm the methodology and approach to the assessment. Throughout the duration of the Offshore Project, collaboration between the Offshore Project team and external stakeholders will be established. Organisations that will be consulted with respect to this specific EIA topic, include but are not limited to:


- MD-LOT
- NatureScot
- WDC
- SWT
- HWDT
- The Highland Council

6.7.6.3. Policy, Legislation and Guidance


The assessment of Marine Mammals and Other Megafauna will consider the legislation, policy and guidance listed below (Table 6.7-6).

Table 6.7-6 Legislation, Policy and Guidance Relevant to the Marine Mammals and Other Megafauna Assessment.

Relevant Legislation, Policy and Guidance
Legislation and Policy
Marine Scotland Act, 2010
Marine and Coastal Access Act, 2009

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Relevant Legislation, Policy and Guidance
Environmental Assessment (Scotland) Act, 2009
Scotland's National Marine Plan, 2015
Sectoral Marine Plan (North)
Blue Economy Vision
Habitats Regulations (Annex I features)
Marine Strategy Framework Directive and Good Environmental Status
Agreement on Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS)
Annex II of the Habitats Directive (EU Directive 92/43/EEC)
Annex IV of the Habitats Directive (EU Directive 92/43/EEC)
Annex V of the Habitats Directive (pinnipeds)
The Conservation of Offshore Marine Habitats and Species Regulations 2017
Nature Conservation (Scotland) Act 2004
Wildlife and Countryside Act 1981
Guidance
The Scottish Government Strategy for Marine Nature Conservation
2020 Challenge for Scotland's Biodiversity
Scotland's National Marine Plan (NMP)
Guidance on exposure criteria and safe thresholds for marine mammals to underwater noise (Southall <i>et al.</i> 2019; 2020)
JNCC guidelines for minimising the risk of injury to marine mammals from explosive use in the marine environment (JNCC, 2025)
JNCC guidance for the use of Passive Acoustic Monitoring in UK waters for minimising the risk of injury to marine mammals from offshore activities (JNCC, 2023b)
JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (JNCC, 2017)
Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise (JNCC, 2010)
Marine Scotland 2020 – Marine European protected species: protection from injury and disturbance
UK BAP List of Priority Species
OSPAR List of Threatened and/or Declining Species and Habitats (OSPAR Agreement 2008-06)
Guidance on Environmental Considerations for Offshore Wind Farm Development (OSPAR, 2008)
Scottish National Heritage (SNH) - Guidance on Survey and Monitoring in Relation to Marine Renewables Deployments in Scotland Volume: Benthic Habitats (SNH, 2011)

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Relevant Legislation, Policy and Guidance
Cefas – Guidance Note for Environmental Impact Assessment in Respect of Food and Environmental Protection Act (FEPA) and Coast Protection Act (CPA) Requirements
Cefas - Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects
Decommissioning of Offshore Renewable Energy Installations Under the Energy Act: Guidance Notes for Industry (BEIS, 2019)

6.7.6.4. Assessment Methodology


The assessment will follow the methodology described in Chapter 4: Proposed Approach of EIA. Further refinement of the methodology and Wider Marine Mammals and Other Megafauna Study Area will be undertaken prior to the chapter being written as part of the baseline and stakeholder engagement. Cumulative and transboundary effects are also discussed in Chapter 4: Proposed Approach to EIA, and assessment of these will apply to Marine Mammals and Other Megafauna.

The main aim of the Marine Mammals and Other Megafauna assessment is to further understand and characterise the existing environment in the Marine Mammals and Other Megafauna Study Area. A greater understanding of the key receptors identified, including cetaceans, pinnipeds, lutrinae and other megafauna, will assist in providing a firm baseline for any potential effect of the Offshore Project. All potential impacts will be assessed using expert judgement, guidance documents, and informed by consultations with relevant stakeholders and consultees.

The Offshore EIAR will apply standard EIA methodology to demonstrate the significance of the effects anticipated from the Offshore Project, considering both individual and cumulative impacts in relation to other relevant plans, projects, and activities, if necessary. The assessment will focus on the potential magnitude of change to baseline conditions caused by the Offshore Project, the sensitivity of affected receptors, and any proposed mitigation measures.

Magnitude and duration of impact will be considered under the Marine Mammals and Other Megafauna assessment, alongside the reversibility of the impact and the timing and frequency of the activity. An assessment of the likely significant effects of the Offshore Project will be undertaken through application of the evidence base.

Technical input and consultations with key stakeholders will be incorporated as the Offshore Project advances through the EIA stages, to evaluate potential impacts in line with best practice guidance and industry standards established from previous offshore wind projects. Once the list of potential receptors and the assessment methodology have been finalised, the significance of potential effects will be evaluated

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by considering receptor value, sensitivity (including tolerance, recovery, and exposure), and the magnitude (extent, duration, frequency and reversibility) of the impact.

While the final design and construction methods are yet to be determined, the primary concerns for Marine Mammals and Other Megafauna receptors are expected to relate to underwater noise generation (especially from piling and UXO clearance) and disturbances caused by vessel activity. These impacts will be assessed through a desk-based review of noise assessments from other offshore wind projects and site-specific noise modelling. Underwater noise modelling will be conducted, and the results will be combined with site-specific and desk-based density estimates of Marine Mammals and Other Megafauna receptors to quantify the impacts and any potential adverse effects. Reference will be made to industry-standard acoustic injury thresholds for subsea noise, as outlined in Southall *et al.* (2019) (for marine mammals) and Popper *et al.* (2014) (specifically for sharks, tuna, ocean sunfish, and turtles). Where necessary, mitigation measures may be proposed to address any residual effects.

6.7.7. SCOPING QUESTIONS FOR CONSULTEES


Scoping questions for consultees in relation to the Marine Mammals and Other Megafauna Assessment include:

1. Do you agree that the data sources referenced above to inform the baseline are valid for the purposes of this scoping assessment?
2. Have all Marine Mammal and Other Megafauna receptors and potential impacts that could result from the Offshore Project been identified?
3. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts for Marine Mammal and Other Megafauna?
4. Do you agree with the assessment methodology proposed to be undertaken within the Offshore EIAR?
5. Do you agree that the designed in mitigation measures described provide a suitable means for managing and mitigating the relevant potential effects of the Offshore Project on Marine Mammal and Other Megafauna receptors?

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6.8. MARINE AND INTERTIDAL ORNITHOLOGY

6.8.1. INTRODUCTION

This chapter of the Offshore Scoping Report provides an overview of the baseline environment for marine and intertidal ornithology within the Array Area and Offshore Cable Corridor Area of Search. It also includes a scoping assessment of likely significant effects for the relevant receptors, from the construction, operation (including maintenance), and decommissioning phases of the Offshore Project.

6.8.2. STUDY AREA

The Marine and Intertidal Ornithology Study Area has been defined as the Array Area plus a 10 km buffer to assess species most likely to be present within the Array Area and its immediate vicinity (Figure 6.8-1).


The 10 km buffer aligns with the survey area for the Offshore Project site-specific seabird and marine mammal DAS, as agreed through consultation with NatureScot (APEM, 2024). The Intertidal Ornithology Study Area has been defined as the Landfall Area of Search plus a 15 km buffer to assess species most likely to be present within the Landfall Area of Search and its immediate vicinity (Figure 6.8-2).

For ornithological receptors, a wider zone of influence is predicted compared to the direct area of works. For the purpose of the Offshore Scoping Report, a Wider Marine and Intertidal Ornithology Study Area has been utilised, capturing key regional SPAs and seabird colonies (see Table 6.8-1). The Wider Marine and Intertidal Ornithology Study Area reflects foraging areas and migratory routes associated with seabird colonies, extending 150 km from the Array Area. This Wider Marine and Intertidal Ornithology Study Area also covers the Offshore Cable Corridor Area of Search.

The scoping design envelope extends to MHWS. Impacts from offshore infrastructure will be considered for receptors positioned both below MHWS, and above MHWS where applicable. It should be noted that the topic-specific study area will vary depending on the nature and scale of each receptor, or associated pathway, that could result in a receptor effect.

Table 6.8-1 Overview of the Marine and Intertidal Ornithology Study Area, Wider Marine and Intertidal Ornithology Study Area and Intertidal Ornithology Study Area

Area	Definition	Spatial Extent (km²)
Marine and Intertidal Ornithology Study Area	Array Area plus a 10 km buffer	1,677
Wider Marine and Intertidal Ornithology Study Area	Array Area plus a 150 km buffer, covering key regional SPAs*	85,571

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Area	Definition	Spatial Extent (km²)
Intertidal Ornithology Study Area	Landfall Area of Search plus a 15 km buffer	2,323

* For the Wider Marine and Intertidal Ornithology Study Area, an arbitrary buffer of 150 km has been applied at this stage. This buffer covers the primary SPAs of the most frequently observed seabird species in the site-specific DAS, whilst maintaining a manageable list of SPAs at the scoping stage. For the HRA and EIA, connectivity to seabird colonies will be established using at sea foraging distances or through the Seabird Offshore Renewable Development (SeabORD) Tool (Searle *et al.* 2018), where appropriate. For the Offshore EIAR, the Wider Marine and Intertidal Ornithology Study Area will be dependent on species specific seabird foraging ranges (breeding season) and review of Biologically Defined Minimum Population Scales (BDMPS) defined by Furness (2015).

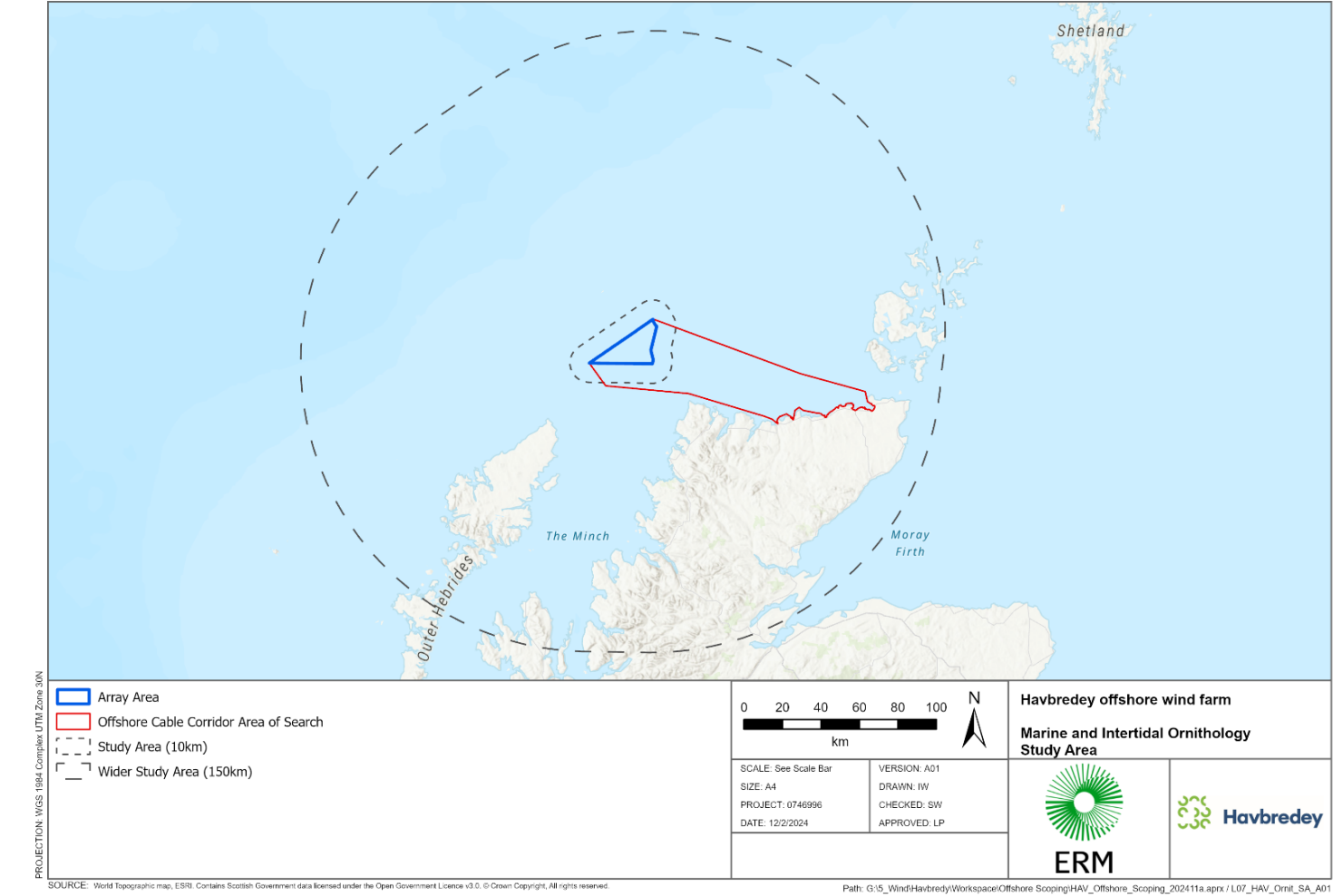


Figure 6.8-1 Marine and Intertidal Ornithology Study Area and Wider Marine and Intertidal Ornithology Study Area

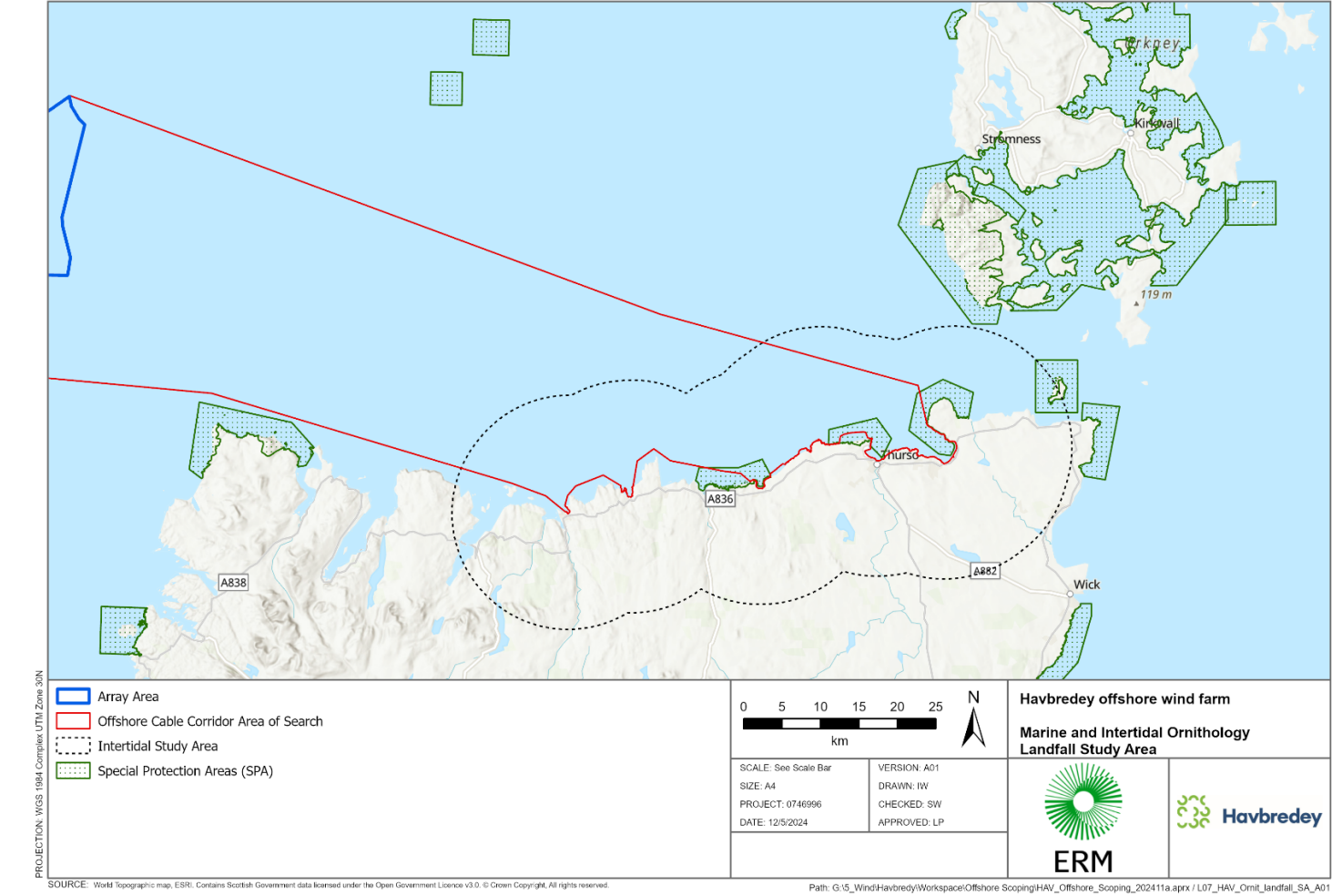



Figure 6.8-2 Intertidal Ornithology Study Area

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6.8.3. BASELINE ENVIRONMENT

6.8.3.1. Data Sources

Data sources used to inform this Marine and Intertidal Ornithology Chapter of the Offshore Scoping Report are presented in Table 6.8-2. These data sources will be taken forward and used to inform the EIA, alongside site-specific survey data collected for the Offshore Project as discussed below.

Table 6.8-2 Summary of Key Data Sources for Marine and Intertidal Ornithology


Source	Spatial Coverage	Year	Summary
Review of key species at risk from offshore wind farm collisions (Martin and Banks, 2023)	UK	2023	A review of previous research, providing vision-based mitigation measures for seabird species vulnerable to collisions with OWFs
Distribution maps of cetaceans and seabirds (Waggitt <i>et al.</i> 2019)	UK	2019	UK-wide distribution maps of various seabird and cetacean species
Seabird distribution within the British Fishery Limit (Kober <i>et al.</i> 2010)	UK	2010	Modelled seabird distribution per season for a wide range of species, covering the British Fishery Limit
Seabird 2000 Census (Mitchell <i>et al.</i> 2004)	UK	2000	Distribution maps and regional population estimates for 25 seabird species from surveys executed between 1998-2002
Seabird Count (fourth Breeding Seabird Census) (Burnell <i>et al.</i> 2023)	UK	2023	Seabird breeding season population estimates for surveys conducted 2015-2021
RSPBs Future of the Atlantic Marine Environment (FAME) and Seabird Tracking and Research (STAR) Survey Data (Cleasby <i>et al.</i> 2018)	UK and Ireland	2010-2015	GPS tagging data collected between 2010-2014 at UK breeding colonies for northern fulmar <i>Fulmarus glacialis</i> , European shag <i>Gulosus aristotelis</i> , black-legged kittiwake <i>Rissa tridactyla</i> , common guillemot <i>Uria aalge</i> , and razorbill <i>Alca torda</i>
European Union for Bird Ringing (EURING) Migration Atlas (Spina <i>et al.</i> 2022)	Flyways between Eurasia and Africa	2023	Online atlas of interactive maps detailing the migratory movements of 300 species. The collated data is gathered using ringing and other

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Source	Spatial Coverage	Year	Summary
			tracking devices. Includes variables from age of individuals to seasonal patterns
European Seabirds at Sea (ESAS) (ICES, 2022)	UK	> 1991	Offshore monitoring data of seabirds (and marine mammals) collected during aerial or ship-based surveys.
Mean maximum foraging ranges plus 1 Standard Deviation (SD) (Woodward <i>et al.</i> 2019)	UK	2019	Species-specific foraging ranges derived from published literature for UK breeding seabirds
National Biodiversity Network (NBN) Atlas	Marine and Intertidal Ornithology Study Area and wider UK	2022	Collaborative project that aggregates biodiversity data, including ornithology, for public access
Designated site documentation and sources therein	UK SPAs	-	SPA citations, departmental briefs, conservation advice packages, and advice on operations documents produced by Statutory Nature Conservation Bodies (SNCBs)
West of Orkney OWF EIA (XODUS Group Ltd, 2023)	UK	2023	Offshore and Intertidal Ornithology chapter provides information of birds likely to be present in the Wider Marine and Intertidal Ornithology Study Area of the Offshore Project
Pentland FLOW EIA (XODUS Group Ltd, 2022)	UK	2022	Marine Ornithology chapter provides information of birds likely to be present in the Wider Marine and Intertidal Ornithology Study Area of the Offshore Project

6.8.3.2. Site-Specific Surveys

To provide site-specific and up to date information on which to base the impact assessment, a series of site-specific seabird and marine mammal DAS have been programmed to cover the Marine and Intertidal Ornithology Study Area. The surveys are planned for a period of 24 months, the first of which was undertaken in March 2023. Data from the first year of the site-specific DAS (March 2023 to February 2024)

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were available to inform this Offshore Scoping Report. The primary purpose of such surveys is to acquire data for the assessment of bird abundance and distribution of species present within the Marine and Intertidal Ornithology Study Area.

6.8.3.3. Overview of the Baseline Environment

Supporting this Offshore Scoping Report, an initial desk-based review of literature and available data sources (see Table 6.8-2) has been undertaken; the findings are presented below, to provide an understanding of the baseline environment for marine and intertidal ornithology.

Bird groups including petrels, shearwaters, gannets, gulls, terns, and auks are likely to be present, as confirmed by site-specific DAS. The Wider Marine and Intertidal Ornithology Study Area may be used for foraging, or for other essential behaviours such as migrating, passage, loafing, breeding, and nesting. A summary of the offshore baseline environment is provided below, including a summary of regional SPAs, data collected via site-specific DAS, regional and contextual data from third party sources, and modelled seabird distribution data.

Regional Special Protection Areas and Nature Conservation Marine Protected Areas with Marine Components

There are no SPAs with marine components (i.e. classified seabird populations) located within the Marine and Intertidal Ornithology Study Area, however there are several within the Wider Marine and Intertidal Ornithology Study Area, including one that overlaps with the Offshore Cable Corridor Area of Search (Figure 6.8-3). This is the North Caithness Cliffs SPA, designated for the protection of fulmar, guillemot, kittiwake, peregrine, Atlantic puffin and razorbill.

A summary of the number of SPAs within the Wider Marine and Intertidal Ornithology Study Area in which each seabird species is a qualifying feature is presented in Table 6.8-3. The rows of the table highlighted in grey refer to the species fulmar, kittiwake, auks, European shag and red-throated dive, which are commonly classified features of regional SPAs, suggesting that the northwest of Scotland is important for these species as breeding and foraging grounds.

The black guillemot is not a qualifying feature of any SPAs as it is neither migratory nor listed as an Annex I species of the EC Birds Directive. It is a qualifying feature of 2 NCMPAs within the Wider Marine and Intertidal Ornithology Study Area. However, the relevant NCMPAs (East Caithness Cliffs, Papa Westray) are located more than 25 km from the Offshore Project in a straight line over land (increasing to almost 50 km when at-sea distance is measured) and black guillemots have a foraging range of only 10 km (Woodward *et al*, 2019). No other NCMPAs with marine ornithological qualifying features are within the Wider Marine and Intertidal Ornithology Study Area, and therefore the black guillemot and all NCMPAs have been excluded from the qualifying seabird populations considered in relation to the Offshore Project.



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Table 6.8-3 Qualifying Seabird Populations of Special Protection Areas within the Wider Marine and Intertidal Ornithology Study Area (150 km of the Array Area)

Common Name	Scientific Name	Number of SPA sites within Wider Marine and Intertidal Ornithology Study Area
Northern fulmar	<i>Fulmarus glacialis</i>	10
Northern gannet	<i>Morus bassanus</i>	3
Great black-backed gull	<i>Larus marinus</i>	3
European herring gull	<i>Larus argentatus</i>	1
Black-legged kittiwake	<i>Rissa tridactyla</i>	10
Common guillemot	<i>Uria aalge</i>	12
Razorbill	<i>Alca torda</i>	7
Atlantic puffin	<i>Fratercula arctica</i>	8
Leach's storm petrel	<i>Hydrobates leucorhous</i>	3
European storm petrel	<i>Hydrobates pelagicus</i>	3
European shag	<i>Phalacrocorax aristotelis</i>	5
Black-throated diver	<i>Gavia arctica</i>	2
Red-throated diver	<i>Gavia stellata</i>	5
Great northern diver	<i>Gavia immer</i>	4
Great skua	<i>Stercorarius skua</i>	2
Arctic skua	<i>Stercorarius parasiticus</i>	2
Barnacle goose	<i>Branta leucopsis</i>	1
Arctic tern	<i>Sterna paradisaea</i>	1
Common eider	<i>Somateria mollissima</i>	3
Common scoter	<i>Melanitta nigra</i>	1
Velvet scoter	<i>Melanitta fusca</i>	2
Long-tailed duck	<i>Clangula hyemalis</i>	3
Slavonian grebe	<i>Podiceps auritus</i>	4
Peregrine	<i>Falco peregrinus</i>	3
Red-breasted merganser	<i>Mergus serrator</i>	4
Great cormorant	<i>Phalacrocorax carbo</i>	1
Common goldeneye	<i>Bucephala clangula</i>	1
Greater scaup	<i>Aythya marila</i>	3
Bar-tailed godwit	<i>Limosa lapponica</i>	2
Eurasian curlew	<i>Numenius arquata</i>	2
Dunlin	<i>Calidris alpina</i>	2
Greylag goose	<i>Anser anser</i>	2

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Common Name	Scientific Name	Number of SPA sites within Wider Marine and Intertidal Ornithology Study Area
Eurasian oystercatcher	<i>Haematopus ostralegus</i>	2
Common redshank	<i>Tringa totanus</i>	2
Eurasian teal	<i>Anas crecca</i>	1
Eurasian wigeon	<i>Mareca penelope</i>	2
Red knot	<i>Calidris canutus</i>	1
Osprey	<i>Pandion haliaetus</i>	2
Northern pintail	<i>Anas acuta</i>	1
Whooper swan	<i>Cygnus cygnus</i>	1
Waterfowl assemblage	-	2
Seabird assemblage	-	12

Rows highlighted in grey show species that are frequently classified features of SPAs

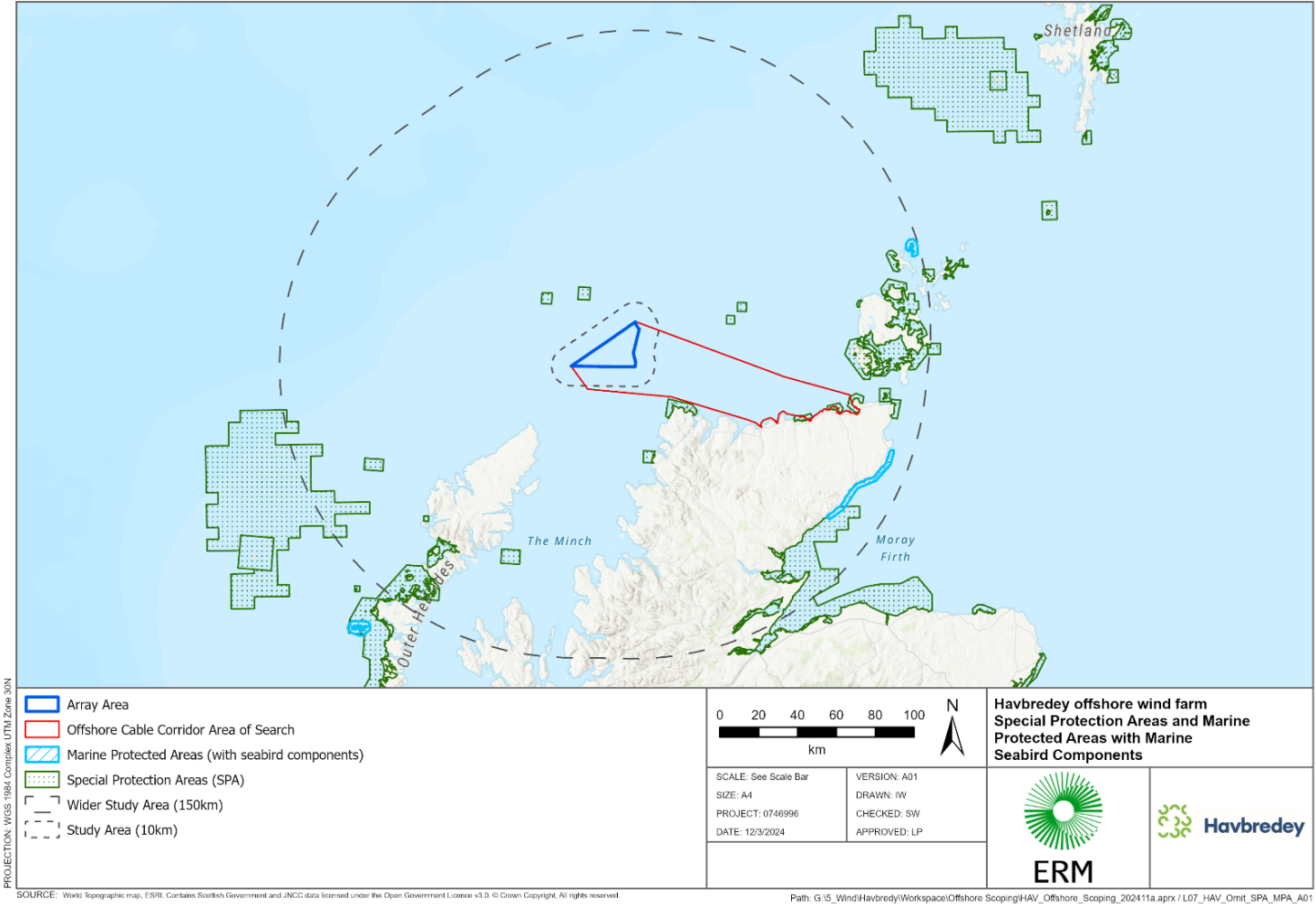



Figure 6.8-3 Special Protection Areas and MPAs with Marine Seabird Components in Northwest Scotland

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Ramsar Sites with Marine Components

There are 4 Ramsar sites with marine components within the Wider Marine and Intertidal Ornithology Study Area, all located in excess of 100 km from the Array Area. There are no Ramsar Sites with marine components within the Intertidal Ornithology Study Area.

Project Specific Data

Site-specific DAS have been successfully executed monthly since March 2023, with data currently available from March 2023 to February 2024. During these months, species that were consistently present across all survey periods include:

- Black-legged kittiwake, which was consistently present in high numbers, primarily in flight
- Auk species (including Atlantic puffin, common guillemot, and razorbill), which were consistently present in high numbers, with most individuals observed loafing
- Northern fulmar, which was observed in high numbers, primarily in flight
- Northern gannet, which was also observed in high numbers, primarily in flight

Other species that were consistently present, albeit in lower numbers, in the survey periods include:


- Great black-backed gull
- Arctic tern
- European storm petrel

The relative abundance of the species recorded in the site-specific DAS data aligns with the number of regional SPAs within the Wider Marine and Intertidal Ornithology Study Area where these species are listed as qualifying features, with black-legged kittiwake, northern fulmar, auks and gannet appearing regularly in high numbers in the survey data.

A low number of European shag and red-throated diver were recorded relative to the number of regional SPAs. The SPAs in which they are designated are not within species specific foraging ranges (23.7 km and 9 km, respectively) of the Array Area and they have a largely coastal distribution. Therefore, they are unlikely to be observed in high numbers offshore, with any observations likely representative of transiting birds.

Using the species abundance and presence from the Year 1 site-specific DAS data and reviews of key species at risk from OWF collisions and displacement (Furness *et al.* 2013; Martin and Banks, 2023), species that may qualify as key receptors, which are more at risk to collisions and displacement, include:

- Black-legged kittiwake
- Great black backed gull

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- Auks, specifically common guillemot and razorbill
- European storm petrel
- Northern gannet


The species listed above are considered at higher risk from OWF collisions and displacement due to potential population level impacts. In contrast, species such as fulmar, Atlantic puffin, and Arctic tern, identified during the site-specific DAS, are not considered key receptors due to their foraging ranges and behaviour.

Fulmar have an extensive foraging range of 542.3 ± 657.9 km (Woodward *et al.* 2019), typically fly close to the sea surface, and are not included in CRM as this low flight height means they are unlikely to encounter turbine blades (BTO, 2011). Atlantic puffin are seasonal and similarly exhibit low flight altitudes near the sea surface. Arctic tern, with a much smaller foraging range of 25.7 ± 14.8 km (Woodward *et al.* 2019), are unlikely to interact with the Array Area, as the Array Area is located farther offshore than their typical foraging range.

European Storm Petrel

European storm petrel were observed during the breeding season (June to August 2023) and the early non-breeding season (September 2023) in the site-specific DAS. It should be noted that this is a nocturnal species, foraging primarily at night (Militão *et al.* 2022). Therefore, their presence and activities may be underrepresented in the site-specific DAS since the surveys are only conducted during daylight hours. A review of third-party data and studies is presented below to supplement the site-specific DAS data.

The results of other at sea surveys and tracking data in published studies indicate that the WoS is not an important area for European storm petrel compared to other regions. Storm petrel are abundant in the north of Scotland inshore around Orkney and Shetland with peak numbers between June and September (Hall *et al.* 1987). From 1979 to 1994, ESAS data show that European storm petrel were mainly observed over the outer shelf and shelf break northwest of Scotland in May and June, with low densities on the west coast (Stone *et al.* 1995). In July and August, they were more widespread north and WoS, with the highest densities along the shelf edge. Between September and November, their densities remained low, but they were still present on the continental shelf WoS. Spatial analysis of data collected from 1979 to 2006 indicates a largely northern and western distribution on the Scottish Continental Shelf, with an area of high density located 100 km north of the Isle of Lewis (Kober *et al.* 2010). Data from 1980 to 2018 show presence in all Seabird Monitoring Programme regions, with peak densities recorded throughout the continental shelf from northeast of Shetland to southwest of Ireland (Waggitt *et al.* 2019).

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Tracking studies are limited; however, Bolton (2021) analysed data from the Shetland colony at Mousa, which showed individuals foraging in an area to the south of Shetland (up to 397 km, with a median foraging range of 159 km). Although high concentrations of the species had been recorded to the west in previous boat-based surveys, foraging patterns from this colony did not extend significantly towards the west coast of Scotland. Most foraging activity associated with the Mousa colony was over shallower waters to the south. Review of available literature did not identify any tracking studies which suggest the Offshore Project overlaps with a significant foraging hotspot for European storm petrel.

Although higher densities of European storm petrel are concentrated along the outer shelf and shelf break to the northwest of Scotland, particularly north of the Isle of Lewis and the Shetland Islands (Kober *et al.* 2010; Waggitt *et al.* 2019), the mean maximum foraging range of the species (336 km¹¹; Woodward *et al.* 2019) encompasses the Offshore Project. Based on the available data, it is reasonable to conclude that the Offshore Project may occupy an area of sea that is of some importance to European storm petrel (e.g. Waggitt *et al.* 2019). However, the limited evidence introduces uncertainty, particularly given the species nocturnal activity patterns. In light of evidence suggesting potential use of the area and to ensure a precautionary assessment, European storm petrel is included as a key offshore ornithology receptor.


Third Party Regional Data

EURING Migration Atlas and the Seabird 2000 Census are among the third-party regional datasets used to inform the baseline environment.

Seabird 2000 Census data (Mitchell *et al.* 2004) provide a regional context and indication of likely important species for consideration. The latest available seabird census data is the fourth breeding season census 'Seabirds Count' published in 2023 (Burnell *et al.* 2023). This will be used to provide regional and background context to the site-specific DAS data in the Offshore EIAR. The data suggest that the region is important for the species designated for protection in the North Rona and Sula Sgeir SPA, approximately 22 km from the Array Area:

- Black-legged kittiwake (400+ Apparently Occupied Nests (AON))
- Common guillemot (5,000+ individuals) utilise the area
- European shag (40 AON)
- Great black-backed gull (40+ AON)
- Herring gull (1 AON)


¹¹ Based on a meta-analysis of data presented by Critchley *et al.* (2018), undertaken prior to the tracking study by Bolton (2021) at the Mousa colony.

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- Northern fulmar (1,200+ Apparently Occupied Sites (AOS))
- Northern gannet (12,000+ AOS/AON)
- Razorbill (300+ individuals) utilise the area
- Atlantic puffin (3,000+ Apparently Occupied Burrow (AOB))
- Arctic tern (80 AON)
- Great skua (30+ Apparently Occupied Territory (AOT))
- Lesser black-backed gull (0 AON)

As recommended by NatureScot (2023), migratory birds (excluding seabirds) that may interact with the Marine and Intertidal Ornithology Study Area were identified through review of Marine Scotland’s strategic assessment (WWT Consulting and MacArthur Green, 2014). Data from the EURING Migration Atlas (Spina *et al.* 2022) were also reviewed. The species most likely to be at risk include (noting that this comprises a high-level review of the written report, and the list should not be considered exhaustive at this stage):

- Whooper swan *Cygnus cygnus*
- Pink-footed goose *Anser brachyrhynchus*
- Greenland white-fronted goose *Anser albifrons*
- Icelandic greylag goose *Anser anser*
- Greenland barnacle goose *Branta leucopsis*
- Canadian light-bellied brent goose *Branta bernicula hrota*
- Wigeon *Anas penelope*
- Teal *Anas crecca*
- Northern pintail *Anas acuta*
- Tufted duck *Aythya fuligula*
- Long-tailed duck *Clangula hyemalis*
- Greater scaup *Aythya marila*
- Common scoter *Melanitta nigra*
- Eurasian oystercatcher *Haematopus ostralegus*
- European golden plover *Pluvialis apricaria*
- Sanderling *Calidris alba*
- Dunlin *Calidris alpina schinzii* and *Calidris alpina arctica*
- Snipe *Gallinago gallinago*
- Black-tailed godwit *Limosa limosa*
- Whimbrel *Numenius phaeopus*
- Common redshank *Tringa totanus*
- Ruddy turnstone *Arenaria interpres*

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Out of the species listed above, only whooper swan has been recorded in site-specific DAS.


Modelled Seabird Distribution Data

European Seabirds at Sea

Whilst observational data can be considered more valuable and accurate than modelled seabird distribution data, observation data frequently do not cover specific areas of interest. Therefore, modelled seabird distribution data has also been reviewed. The ESAS data has been used to inform species distribution maps produced by Kober *et al.* (2010) to identify important areas that may qualify as marine SPAs, and by Waggitt *et al.* (2019) to map population distribution in the northeast Atlantic in January and July. Species with hotspots of increased density in northern, western, and northwestern Scotland, as well as around the Orkney Islands within the Wider Marine and Intertidal Ornithology Study Area (Waggitt *et al.* 2019; Kober *et al.* 2010), along with corresponding observations recorded from the available site-specific DAS, are summarised in Table 6.8-4.

Table 6.8-4 European Seabirds at Sea Species with Hotspots in the Wider Marine and Intertidal Ornithology Study Area


Common Name	Scientific Name	Period	Source	Site-specific DAS Observation
Black-legged kittiwake	<i>Rissa tridactyla</i>	May-September	Kober <i>et al.</i> (2010)	Supported
		July	Waggitt <i>et al.</i> (2019)	
Common guillemot	<i>Uria aalge</i>	May-June	Kober <i>et al.</i> (2010)	Supported
		July	Waggitt <i>et al.</i> (2019)	
		October-April	Kober <i>et al.</i> (2010)	Supported
		January	Waggitt <i>et al.</i> (2019)	Supported
Razorbill	<i>Alca torda</i>	July	Waggitt <i>et al.</i> (2019)	Low numbers observed
Atlantic puffin	<i>Fratercula arctica</i>	April-June	Kober <i>et al.</i> (2010)	Supported
		July	Waggitt <i>et al.</i> (2019)	
		August-March	Kober <i>et al.</i> (2010)	Supported

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Common Name	Scientific Name	Period	Source	Site-specific DAS Observation
European storm petrel	<i>Hydrobates pelagicus</i>	July	Waggitt <i>et al.</i> (2019)	No observations
Northern fulmar	<i>Fulmarus glacialis</i>	March-July	Kober <i>et al.</i> (2010)	Supported
		July	Waggitt <i>et al.</i> (2019)	
Northern gannet	<i>Morus bassanus</i>	May-September	Kober <i>et al.</i> (2010)	Supported
		July	Waggitt <i>et al.</i> (2019)	
European shag	<i>Gulosus aristotelis</i>	March-September	Kober <i>et al.</i> (2010)	No observations
		July	Waggitt <i>et al.</i> (2019)	
		October-February	Kober <i>et al.</i> (2010)	
Great skua	<i>Stercorarius skua</i>	May-August	Kober <i>et al.</i> (2010)	Low numbers observed in August
		July	Waggitt <i>et al.</i> (2019)	No observations
Manx shearwater	<i>Puffinus puffinus</i>	May-September	Kober <i>et al.</i> (2010)	Low numbers observed
		July	Waggitt <i>et al.</i> (2019)	No observations

Based on a merged 5% threshold¹², Kober *et al.* (2010) suggest that the region is of ‘most’ importance to breeding black-legged kittiwake, guillemot, and puffin, relative to other seabird species. However, it is recognised that other data sources, and the available site-specific DAS data, indicate importance to other species as well.

¹² Top 5% hot spot locations as determined by Getis-Ord (GI*) analysis (measurement of the concentration of high or low values within the Marine and Intertidal Ornithology Study Area).

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FAME and STAR

The RSPB undertook seabird tracking from 2010-2015, monitoring movements of 4 seabird species during the chick-rearing period: shag, kittiwake, guillemot, and razorbill (Cleasby *et al.* 2018). Habitat models were used to predict the at-sea distribution of these species, to identify important areas of high seabird density. The outputs of the models found hotspots for all 4 species on a UK-scale.

Hotspots of all 4 species are located within the Wider Marine and Intertidal Ornithology Study Area, with hotspots identified for kittiwake and guillemot overlapping the Marine and Intertidal Ornithology Study Area (Figure 6.8-4). The northern and central northwest coasts of the Isle of Lewis were identified as hotspots for shag, whereas most of the island represented areas for kittiwake and razorbill. The north coast of Scotland was identified as a hotspot for all 4 species, with the Offshore Cable Corridor Area of Search overlapping hotspots for guillemot, kittiwake, and razorbill. Around the Orkney Islands within the Wider Marine and Intertidal Ornithology Study Area, hotspots were identified for all 4 species, although the areas for shag were notably smaller.

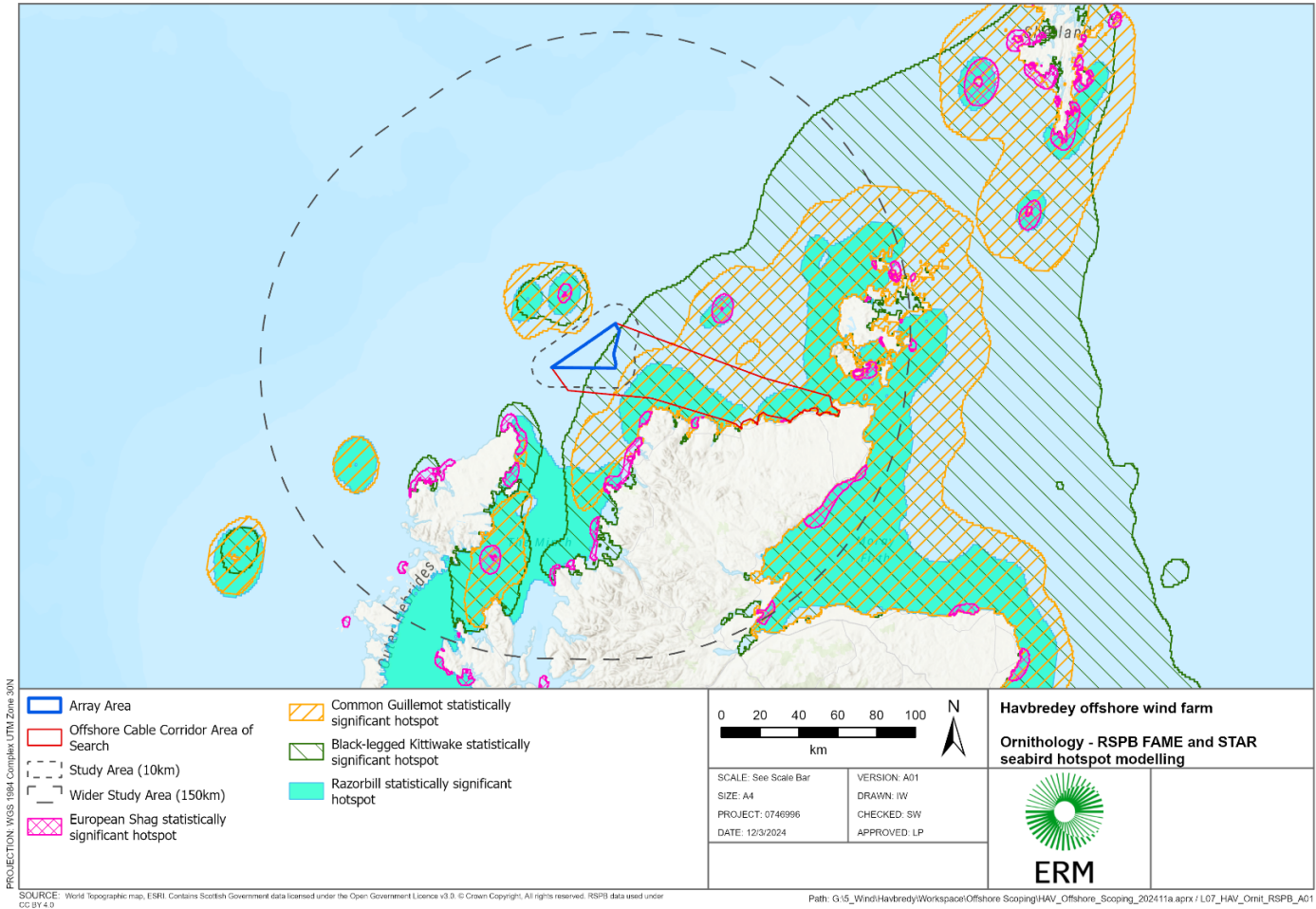



Figure 6.8-4 RSPB FAME and STAR Statistically Significant (Getis-Ord; GI*) Seabird Hotspot Modelling within Wider Marine and Intertidal Ornithology Study Area (Source: Cleasby et al, 2018)

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6.8.4. DESIGNED IN MITIGATION

The designed in mitigation relevant to the Marine and Intertidal Ornithology assessment, which have been incorporated into the current design of the Offshore Project, is outlined below in Table 6.8-5.


Table 6.8-5 Marine and Intertidal Ornithology Designed In Mitigation Measures

ID	Designed In Mitigation Measure	How the measure will be secured
ID003	A CEMP and PEMP will be developed prior to construction and adhered to in compliance with legislative requirements and best practice standards and guidance.	Secured under Section 36 and/or Marine Licence consent conditions.
ID006	The Project will adhere to requirements of relevant international conventions, including MARPOL 73/78.	Secured under Section 36 and/or Marine Licence consent conditions.
ID007	Best practice techniques will be employed through all phases of the Project, and measures will be provided in a MPCP, which will form part of the CEMP and PEMP. SOPEPs will be developed for the Project prior to construction.	Secured under Section 36 and/or Marine Licence consent conditions.
ID009	Compliance with the International Convention for the Control and Management of Ship's Ballast Water and Sediments and adherence to INNS Management Plan to reduce the risk of introducing or spreading invasive species.	Secured under Section 36 and/or Marine Licence consent conditions.
ID012	As part of scheduled maintenance mooring lines and cables will undergo regular inspection. In the event discarded fishing gear is found entangled in these lines/cables a risk-based assessment will be carried out to determine if the fishing gear requires removal.	Secured under Section 36 and/or Marine Licence consent conditions.

6.8.5. SUMMARY OF KEY RECEPTORS, SENSITIVITIES AND LIKELY SIGNIFICANT EFFECTS

Based on site-specific DAS and proximity to SPAs, the key receptors for Marine and Intertidal Ornithology are:

- Black-legged kittiwake
- Great-black backed gull
- Arctic tern

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- Great skua
- Northern gannet
- Auks (Atlantic puffin, common guillemot and razorbill)
- European storm petrel
- Leach’s storm petrel
- Northern fulmar
- European shag

6.8.5.1. Likely Significant Effects

The scoping of likely significant effects on Marine and Intertidal Ornithology receptors which may arise within the Wider Marine and Intertidal Ornithology Study Area via the Offshore Project, is outlined in Table 6.8-6.




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Table 6.8-6 EIA Scoping Assessment for Marine and Intertidal Ornithology


Potential Impact	Scoping Result	Justification	Assessment Method
Construction and Decommissioning			
Short term habitat loss	In	Short term habitat loss associated with vessels and seabed works during construction, decommissioning, and maintenance works. The physical presence of vessels and noise emissions from vessels and construction/decommissioning activities can displace birds from the Offshore Project. This can reduce the amount of available foraging, nesting, and resting habitat.	Habitat loss will be assessed through desk-based assessment. This will involve identification of seabird and foraging areas from published literature and reports and determining the overlap between these areas and Offshore Project activities. Receptor use of the Offshore Project will be determined through review of foraging ranges and foraging areas as well as project specific survey data (e.g. site-specific DAS data). The seasonality of birds and periods of site occupancy will also be considered within the assessment, along with the overall area of habitat available to regional and local colonies and populations. The assessment may be supplemented by site-specific benthic characterisation surveys and the benthic and intertidal ecology impact assessment (refer to Chapter 6.5: Benthic and Intertidal Ecology), where potential effects to prey items will be considered.
Disturbance and displacement	In	Noise and visual disturbance from vessel movements and construction/decommissioning activities such as piling WTG anchors may deter	A desk-based assessment will be undertaken. This will be informed by existing literature and reports on seabird sensitivity to vessel presence and

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Potential Impact	Scoping Result	Justification	Assessment Method
		seabirds. Birds may be displaced from the Array Area and Offshore Cable Corridor Area of Search, and surrounding area through avoidance, restricting access to important foraging and resting areas. Avoidance of the Array Area can also lead to barrier effects, where individuals are required to change flight route to access feeding grounds or migration pathways.	underwater noise. Receptor use of the Offshore Project will be determined through review of foraging ranges and foraging areas as well as Offshore Project specific survey data (e.g. site-specific DAS).
Indirect effects through effects on prey species	In	Changes in prey availability, through physical impacts on prey species and their associated habitat, may have energetic impacts on birds.	Desk-based assessment of impacts to prey items (i.e. benthic ecology and fish and shellfish receptors), largely informed by the outcomes of the benthic ecology and fish and shellfish impact assessments (refer to Chapter 6.5: Benthic and Intertidal Ecology and Chapter 6.6: Fish and Shellfish Ecology).
Artificial Light At Night (ALAN) emissions	In	Petrels and shearwaters are known to respond to artificial lighting; however, the magnitude of the consequences is largely unquantified. Studies have shown differing responses to different sources/types of lighting, and differing responses in adult and juvenile individuals.	Desk-based review of recent studies and research on the impacts of ALAN, with focus on petrels and shearwaters, specifically European storm petrel and Leach's storm petrel. The assessment will be informed by review of existing literature and through consultation with NatureScot and the RSPB, who, at the ornithology scoping workshop

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Potential Impact	Scoping Result	Justification	Assessment Method
			(14 January 2025), noted that there may be additional tracking data available (RSPB, pers. comm.).
Accidental release of pollutants from vessels, WTGs, and plant machinery	Out	Accidental pollutant spills from equipment associated with the Offshore Project may negatively impact seabirds on or in the water; however, an environmental management plan (e.g. a CEMP), which complies with requirements and best practices in accordance with MARPOL and SOPEPs, will reduce the likelihood and minimise the impact of any accidental release of pollutants. Therefore, this impact has been scoped out of the Offshore EIAR.	N/A
Introduction and colonisation by INNS	Out	Increased vessel activity and Offshore Project infrastructure will increase the potential risk of introduction of INNS to the area. INNS may affect seabird foraging through impacts to prey items and supporting habitats. Development of an INNS Management Plan, and adherence to best practices will reduce the probability of occurrence. Therefore, this impact has been scoped out of the Offshore EIAR.	N/A

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Potential Impact	Scoping Result	Justification	Assessment Method
Primary and secondary entanglement from construction of infrastructure, including static inter-array cables and dynamic cales in the water column	Out	Primary and secondary entanglement of Marine and Intertidal Ornithology receptors upon encountering infrastructure is unlikely given the size and physical characteristics of static inter-array cables, dynamic cables and mooring systems. Therefore, this impact has been scoped out from the Offshore EIAR.	N/A
Operation and Maintenance			
Long term habitat loss	In	Physical loss of foraging or supporting habitat associated with the long-term presence of Offshore Project infrastructure. For example, scour protection that results in a change of habitat, or continuous impacts to seabed habitats within the mooring line swept area.	Habitat loss is mostly accounted for within the assessment of distributional responses, whereby birds are displaced from areas of potential foraging habitat. However, this assessment does not encompass impacts to birds that are not sensitive to displacement, or to locations outside the Array Area and its buffer (e.g. the Offshore Cable Corridor Area of Search). Habitat loss due to long-term impacts (e.g. change of seabed substrate due to scour protection installation) to the seabed and to prey species (i.e. benthic ecology and fish and shellfish ecology receptors) within the Offshore Project will be assessed through desk-based identification of seabird and intertidal bird foraging areas and

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Potential Impact	Scoping Result	Justification	Assessment Method
			overlap between these areas and Offshore Project activities. The assessment may be supplemented by site-specific benthic characterisation surveys and the benthic and intertidal ecology impact assessment (refer to Chapter 6.5: Benthic and Intertidal Ecology), where potential effects to prey items will be considered.
Short term habitat loss	In	Short term habitat loss may occur due to operation and maintenance works to cables and other Offshore Project infrastructure. This includes cable repairs and maintenance which affect seabed habitats but are expected to recover and return to near baseline conditions shortly after the works (i.e. it does not include habitat that is continuously affected during the life of the Offshore Project).	Habitat loss will be assessed through desk-based assessment. This will involve identification of seabird and foraging areas from published literature and reports and determining the overlap between these areas and Offshore Project activities. Receptor use of the Offshore Project will be determined through review of foraging ranges and foraging areas as well as project specific survey data (e.g. site-specific DAS data). The seasonality of birds and periods of site occupancy will also be considered within the assessment, along with the overall area of habitat available to regional and local colonies and populations. The assessment may be supplemented by site-specific benthic characterisation surveys and the benthic and intertidal ecology impact assessment (refer to

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Potential Impact	Scoping Result	Justification	Assessment Method
			Chapter 6.5: Benthic and Intertidal Ecology), where potential effects to prey items will be considered.
Disturbance and displacement	In	<p>The presence of above sea surface infrastructure and Offshore Project maintenance activities (e.g. vessel movements) have the potential to result in displacement of birds from the Array Area and Offshore Cable Corridor Area of Search. This can occur through avoidance, restricting access to important foraging and resting areas for the duration of the Offshore Project lifetime.</p> <p>Avoidance of the Array Area can also lead to barrier effects, where individuals are required to change flight route to access feeding grounds or migration pathways. This is particularly important for individuals moving to and from breeding colonies or migrating.</p>	<p>A desk-based assessment will be undertaken. This will be informed by existing literature and reports on seabird sensitivity to vessel presence and underwater noise. Receptor use of the Offshore Project will be determined through review of foraging ranges and foraging areas as well as project specific survey data (e.g. site-specific DAS data).</p> <p>Distributional responses (i.e. displacement from the Array Area plus 2 km buffer due to the presence of offshore infrastructure) will be assessed via the ‘Displacement Matrices’ approach. This involves applying a displacement and mortality rate, as a percentage of birds within the Array Area, informed by the site-specific DAS. Displacement and mortality rates will be based on recommendations and published guidance (noting that NatureScot is due to update its guidance in the near future). Where rates differ from recommendations, these will be discussed with</p>

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Potential Impact	Scoping Result	Justification	Assessment Method
			NatureScot and justified based on best available evidence.
Indirect effects through effects on prey species	In	Changes in prey availability, through physical impacts on prey species and their associated habitat caused by operation and maintenance activities, may have energetic impacts on birds.	Desk-based assessment of impacts to prey items (e.g. benthic ecology and fish and shellfish receptors), largely informed by outcomes of the benthic ecology and fish and shellfish impact assessments (refer to Chapter 6.5: Benthic and Intertidal Ecology and Chapter 6.6: Fish and Shellfish Ecology).
Collision risk	In	Rotating turbine blades introduce a potential for in-air collision. Such collisions can result in injury and in some cases mortality. Attraction to artificial lighting, particularly in nocturnally migrating species and tubenose species, can increase risk of collision.	Quantitative desk-based assessment using site-specific density estimates of flying seabirds (informed by the site-specific DAS data). Collision modelling will be undertaken using the most robust version of the stochastic Collision Risk Model (sCRM) Tool (Caneco, 2022) available, incorporating recommended and generic seabird parameters (flight height, flight speed, avoidance rates, etc.). Where input parameters differ to published guidance (noting that NatureScot is due to update its guidance in the near future), this will be informed and justified by best available evidence and in discussion with NatureScot. If alternative parameters are used, these will be

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Potential Impact	Scoping Result	Justification	Assessment Method
			compared with the recommended parameters to provide context.
ALAN emissions	In	Petrels and shearwaters are known to respond to artificial lighting; however, the magnitude of the consequences is largely unquantified. Studies have shown differing responses to different sources/types of lighting, and differing responses in adult and juvenile individuals.	Desk-based review of recent studies and research on the impacts of ALAN, with focus on petrels and shearwaters, specifically European storm petrel and Leach's storm petrel, informed by regional and site-specific data. Where available and appropriate, third-party tracking data will be considered in the assessment. If evidence suggests that displacement and/or collision risk are affected by artificial light, and the effects are quantifiable, this will be incorporated into the assessment of distributional responses and collision.
Primary entanglement from presence of infrastructure, including static inter-array cables and dynamic cables in the water column	Out	Primary entanglement of Marine and Intertidal Ornithology receptors upon encountering infrastructure is unlikely given the size and physical characteristics of static inter-array cables, dynamic cables and mooring systems. Therefore, this impact has been scoped out from the Offshore EIAR.	N/A
Secondary entanglement risk due to the presence of lost	In	Ghost fishing gear may become caught on infrastructure present in the water column and	Desk-based review of existing literature on diving seabird sensitivities to entanglement in ghost

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Potential Impact	Scoping Result	Justification	Assessment Method
fishing gear entangled/snagged by infrastructure		seabed presenting an entanglement risk. This is particularly relevant for diving species.	fishing gear. Supplemented by Offshore Project-specific data (distribution and abundance of seabird species within the Array Area).
Accidental release of pollutants from vessels, WTGs, and plant machinery	Out	Accidental pollutant spills from equipment associated with the Offshore Project may negatively impact seabirds on or in the water; however, an environmental management plan (e.g. a PEMP), which complies with requirements and best practices in accordance with MARPOL and SOPEPs, will reduce the likelihood and minimise the impact of any accidental release of pollutants. Therefore, this impact has been scoped out of the Offshore EIAR.	N/A
Introduction and colonisation by INNS	Out	Increased vessel activity and project infrastructure will increase the potential risk of introduction of INNS to the area. INNS may affect seabird foraging through impacts to prey items and supporting habitats. Development of an INNS Management Plan, and adherence to best practices will reduce the probability of occurrence. Therefore, this impact has been scoped out of the Offshore EIAR.	N/A

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6.8.6. PROPOSED APPROACH TO EIA

6.8.6.1. Relevant Data Sources

Data sources listed within Table 6.8-2, alongside further secondary data sources including published and unpublished papers, journals and reports will be used to inform the EIA. These sources may be further supplemented by any additional material identified during stakeholder consultation.

Site-specific surveys will also supplement the desk-based sources, where available. Data from these surveys will enable the Marine and Intertidal Ornithology Study Area to be characterised for EIA purposes and will also inform the assessment. Ongoing survey data from the site-specific DAS, covering a 2-year period, will be available prior to commencement of the EIA. This will characterise the density of birds, and their usage of the Marine and Intertidal Ornithology Study Area. Furthermore, a vantage point survey to monitor bird flight activity and usage of the Intertidal Ornithology Study Area will also be available prior to commencement of the EIA; the scope and duration of this study will be consulted on with relevant stakeholders once the landfall location is refined. Data gaps in areas not covered by these site-specific vantage point surveys will be fulfilled through desk-based sources and review of literature.

6.8.6.2. Consultation

Consultation and engagement will be key to confirm the methodology and approach to the assessment. Throughout the duration of the Offshore Project, collaboration between the Offshore Project team and external stakeholders will be established. Organisations that will be consulted with respect to this specific EIA topic, include:


- MD-LOT
- NatureScot
- JNCC
- RSPB
- SWT
- The Highland Council

6.8.6.3. Policy, Legislation and Guidance


The assessment of Marine and Intertidal Ornithology will consider the legislation, policy and guidance listed below (Table 6.8-7).

Table 6.8-7 Legislation, Policy and Guidance Relevant to the Marine and Intertidal Ornithology Assessment

Relevant Legislation, Policy and Guidance
Legislation and Policy
Marine Scotland Act, 2010

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Relevant Legislation, Policy and Guidance
Marine and Coastal Access Act, 2009
Environmental Assessment (Scotland) Act, 2009
Scotland's National Marine Plan, 2015
Sectoral Marine Plan (North)
Blue Economy Vision
Habitats Regulations (Annex I features)
Marine Strategy Framework Directive and Good Environmental Status
UK BAP List of Priority Species
Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006
Annex I of the Birds Directive (Directive 2009/147/EC)
The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)
OSPAR Convention (Convention for the Protection of the Marine Environment of the North-East Atlantic)
The Wildlife and Countryside Act 1981 (as amended)
Guidance
NatureScot (2023) Guidance to support Offshore Wind Applications: Marine Ornithology (noting that NatureScot expects to update this guidance in the near future)
Mackenzie <i>et al.</i> (2013) Statistical Modelling of Seabird and Cetacean data: Guidance Document
Woodward <i>et al.</i> (2019) Desk-based revision of seabird foraging ranged used for HRA screening
WWT (2014) Strategic assessment of collision risk of Scottish offshore wind farms to migrating birds
Furness (2015) Non-breeding season populations of seabirds in UK waters: Population sizes for BDMPS
Band (2012) Using a Collision Risk Model to assess bird collision risks for Offshore Windfarms
Masden (2015) Using a Collision Risk Model to assess bird collision risks for Offshore Windfarms
McGregor <i>et al.</i> (2018) A Stochastic Collision Risk Model for seabirds in flight
Johnston <i>et al.</i> (2014) Modelling flight heights of marine birds to more accurately assess collision risk with offshore wind turbines
Garthe and Hüppop (2004) Scaling possible adverse effects of marine wind farms on seabirds: developing and applying a vulnerability index
Furness <i>et al.</i> (2018) Nocturnal flight activity of northern gannets <i>Morus bassanus</i> and implications for modelling collision risk at offshore wind farms
Pennycuick (1997) Actual and 'optimal' flight speeds: field data reassessed
Alerstam <i>et al.</i> (2007) Flight speeds among bird species: Allometric and Phylogenetic Effects
SNCBs (2017) Joint SNCB Interim Displacement Advice Note
SNCBs (2022) Joint SNCB Interim Advice on The Treatment of Displacement For Red-Throated Diver
Searle <i>et al.</i> (2018) Finding out the fate of displaced birds
Searle <i>et al.</i> (2022) Study to examine the feasibility of extending SeabORD to the entire breeding season

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Relevant Legislation, Policy and Guidance
Horswill and Robinson (2015) Review of seabird demographic rates and density dependence
Green (2014) Misleading use of science in the assessment of probably effect of offshore wind projects on populations of seabirds in Scotland
Cook and Robinson (2016) Testing sensitivity of metrics of seabird population response to offshore wind farm effects
Jital <i>et al.</i> (2017) Testing and Validating Metrics of Change Produced by Population Viability Analysis (PVA)


6.8.6.4. Assessment Methodology

The assessment will follow the methodology described in Chapter 4: Proposed Approach to EIA. Further refinement of the methodology and Wider Marine and Intertidal Ornithology Study Area will be undertaken prior to the chapter being written as part of the baseline and stakeholder engagement. Cumulative and transboundary effects are also discussed in Chapter 4: Proposed Approach to EIA, and assessment of these will apply to Marine and Intertidal Ornithology.

The main aim of the Marine and Intertidal Ornithology assessment is to further understand and characterise the existing environment in the Marine and Intertidal Ornithology Study Area. A greater understanding of the key receptors identified will assist in providing a firm baseline for any potential effect of the Offshore Project. The receptors identified include:

- Black legged kittiwake
- Great black backed gull
- Arctic tern
- Great skua
- Northern gannet
- Auks (Atlantic puffin, common guillemot and razorbill)
- European storm petrel
- Northern fulmar
- European shag

The Offshore EIAR will apply standard EIA methodology to demonstrate the significance of the effects anticipated from the Offshore Project, considering both individual and cumulative impacts in relation to other relevant plans, projects, and activities, if necessary. The assessment will focus on the potential magnitude of change to baseline conditions caused by the Offshore Project, the sensitivity of affected receptors, and any proposed mitigation measures. Transboundary effects are effects on receptors that are

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located wholly or partly within the jurisdiction of another State. Transboundary effects associated with marine ornithology will be assessed through identification of connectivity with SPAs and colonies, and apportioning of impacts, as described below.

The approaches for apportioning, collision risk, distributional responses, and PVA, as discussed below, follow the latest (as of February 2025) guidance published by NatureScot (2023), are presented in Appendix 1.

Attribution of Non-identified Birds


In some cases, individuals may not be identifiable to species level, in which case, these birds will be assigned to groups at the highest resolution possible. The unassigned or grouped individuals will then be ascribed to species based on the proportion of identified birds identified to each species. Impact mortality estimates will be apportioned to colony/SPA populations in accordance with NatureScot (2023) guidance. However, it is noted that the associated guidance note (Guidance Note 10) has not yet been published.

Estimation of Regional Reference Populations

Regional reference populations for the breeding and non-breeding seasons will be estimated based on the most recent and robust data available at the time of the assessment. Impacts associated with the Offshore Project will be assessed against these populations in order to determine whether it is of significance or not.

For the non-breeding season, standard practice in the UK is to use the BDMPS by Furness (2015). This study, although dated, presents the most comprehensive assessment of non-breeding season populations of the UK's seabird species. The study divides the UK into different reference areas/populations, and the most relevant one(s) will be selected to inform the regional populations. Furness (2015) defines seabird seasons; however, these will be compared with NatureScot advice on seabird seasonality in Scotland (NatureScot, 2020). Where there are discrepancies, the Scottish seasonality advice will take preference as this is more spatially relevant to the Offshore Project. Here, population estimates may require adjustment to account for differences in seasonality.

For the breeding season, the primary data sources will comprise the Seabirds Count (Burnell *et al.* 2023), which utilises census data from 2015-2021 to provide breeding population estimates, and the Seabird Monitoring Programme by British Trust for Ornithology (BTO) (2024), if more recent and robust data are available at the time of assessment. Colonies that may interact with the Offshore Project, as determined through review of seabird foraging ranges (Woodward *et al.* 2019; NatureScot, 2023), will be considered to contribute to the regional population. However, the Seabird Monitoring Programme and Seabirds Count do not account for immature and non-breeding birds within the breeding population, the surveys only consider breeding adults. Therefore, adjustments to the reference population will be made to account for immature birds that are present within but not tied to specific colonies or nesting sites. This will be done

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based on the ratio of adult to immature birds presented by Furness (2015) and/or Horswill and Robinson (2015) or informed by site-specific data if available.

Apportioning

In absence of Guidance Note 10, it is proposed that apportioning impacts to SPA populations will involve applying a weighting based on population size (as determined via the Seabird Monitoring Programme), distance between the Offshore Project and the SPA/colony in question, and the interaction between the Array Area and the spatial extent of the foraging range, as outlined by NatureScot (2018). As seabirds are central foragers during the breeding season, the same approach will be applied for all species during this period. During the non-breeding season, however, the approach taken may differ between species, reflecting different behaviours and uses of the marine area.

The approach and methodology will be agreed with NatureScot through consultation. Once published, Guidance Note 10 will be reviewed and assessment methodology updated accordingly. As such, the applied method may deviate from the above.

Collision Risk


As recommended in Guidance Note 7 (NatureScot, 2023), impacts will be assessed through both deterministic and sCRM (Caneco, 2022), with input parameters clearly presented. Guidance on migratory collision risk and an updated migratory Collision Risk Modelling (mCRM) tool is expected to be published imminently and will be incorporated into the approach to EIA as appropriate.

Site-specific DAS data collected from March 2023 until February 2025 will inform identification of sensitive receptors for inclusion in CRM. Review of the data available at present suggests that blacklegged kittiwake, great black backed gull, and gannet are likely to be most at risk from collision impacts.

A minimum of 4 scenarios will be run for each species sensitive to collision risk, covering the most likely and worst-case scenarios for the Offshore Project, using both Option 2 and Option 3 in the sCRM. The outputs will be presented as estimated mortalities per month and season, as well as annual totals.

Site-specific abundance estimates, along with generic flight height and size parameters, will be input into the model. Should site-specific data on these parameters also be collected, additional scenarios using the site-specific data will also be run and compared for additional context.

Should the estimated collision mortality (cumulatively with distributional response impacts) exceed the threshold at any SPA population (0.02% change in baseline mortality rate), PVA will be undertaken to determine population-level effects.

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Distributional Responses (Displacement and Barrier Effects)

As per Guidance Note 8 (NatureScot, 2023), displacement effects and barrier effects will be considered together as 'Distributional Responses'.

Displacement impacts may be assessed via the following two methods (SNCB, 2017, 2022; NatureScot, 2023):

- SeabORD Tool (Searle *et al.* 2018), where applicable (i.e. for black-legged kittiwake and auks during the chick rearing period)
- Displacement matrices, as recommended by NatureScot (2023) and SNCB (2017; 2022)

Interpretation of displacement will involve consideration of NatureScot (2023) and SNCB (2017; 2022) recommended displacement rate (proportion of birds displaced) and mortality rate (proportion of displaced birds that may die). However, evidence at existing developments will also be reviewed and alternative rates, if deemed appropriate, will also be considered within assessment. Species regarded as sensitive to distributional responses and observed in the site-specific DAS data include guillemot, puffin, and razorbill, and, to a lesser extent, gannet.

Should the estimated distributional response mortality (cumulatively with collision impacts) exceed the threshold at any SPA population (>0.02% change in baseline mortality rate), PVA will be undertaken to assess the overall impact to the population throughout the life of the Offshore Project.


Population Viability Analysis (PVA)

PVA is used to model population-level effects and trends, comparing counterfactual baseline (unimpacted) population trends with the predicted impacted population, which can be used to determine whether an effect is significant and can estimate the effectiveness of mitigation or compensatory measures.

It is not possible at this stage to determine whether PVA will be required for the Offshore Project, as this analysis is only applied where adult survival rate is predicted to drop by 0.02 percentage points (NatureScot, 2023).

Should PVA be required, the most recent guidance (Guidance Note 11; NatureScot, 2023) will be adhered to. This notes that a range of elements should be considered, including short- and long-term trends, life history, species and population importance, and climate change.

It is recognised that the full effect of the 2022/2023 Highly Pathogenic Avian Influenza (HPAI)/'bird flu' season is not quantified in any datasets. NatureScot has not published any guidance specific to incorporating HPAI into assessments. As such, the Applicant and its consultants will consult with NatureScot

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and the other SNCBs on the approach to accounting for HPAI within any required PVA, noting that the full effects may not be observable within the data acquired over the duration of site-specific DAS.


NatureScot (2023) recommend the use of the PVA tool (Searle *et al.* 2018), for the Offshore Project lifespan (35 years proposed), as well as for 25 years and 50 years. Life history and starting parameters will be acquired from Horswill and Robinson (2015) and the Seabird Monitoring Programme database (Massimino *et al.* 2019). The PVA parameters used in this assessment are accurate as of January 2025. It is noted that PVA values may be updated by statutory bodies. To ensure transparency and consistency, the date and source of parameter downloads will be documented within the assessment, acknowledging that further updates to these values may occur over time.

Outputs will be presented as the 'Counterfactual of Final Population Size' (CPS) and the 'Counterfactual of Population Growth Rate' (CPC), using published sources, such as Green (2014), Cook and Robinson (2016), and Jital *et al.* (2017), to aid interpretation of the results. Additionally, output graphics (comparative graphs) and the modelled final population sizes will be presented as part of the impact assessment.

6.8.7. SCOPING QUESTIONS FOR CONSULTEES

Scoping questions for consultees in relation to the Marine and Intertidal Ornithology Assessment and to the marine ornithology assessment methodology presented in Appendix 1 include:

1. Do you agree that the data sources referenced above (Table 6.8-2) to inform the baseline are appropriate for the purposes of this scoping assessment?
2. Have all Marine and Intertidal Ornithology receptors and potential impacts that could result from the Offshore Project been identified (Section 6.8.5)?
3. Are there any site-level or pressure-related research projects, as well as any additional guidance due to be published within the next 12 months that may be relevant to this specific project or offshore wind in general?
4. Are there any anticipated changes/additions to the MPA network or coastal SPAs and Ramsar Sites, or any updates to site assessments, within the next 12 months that may be relevant to the Offshore Project?
5. Do you agree with the use of Woodward *et al.* (2019) during the breeding season, BDMPS as defined by Furness (2015) during the non-breeding season, or site-specific, where available and if greater than Woodward *et al.* (2019), foraging ranges for Marine and Intertidal Ornithology?
6. Do you agree with the method proposed for producing a full breeding season population estimate that accounts for immature birds as well as breeding adults (Section 6.8.6.4 - Estimation of Regional Reference Populations and Appendix 1 – Note on Marine and Intertidal Ornithology Assessment Methodology for the Havbredey Offshore Wind Farm- Section 2)?

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7. Do you agree with the proposed approach to assessment (scoped decision) for each of the potentially significant effects in the EIA Scoping Assessment table for Marine and Intertidal Ornithology (Section 6.8.5.1)?
8. Do you agree with the assessment methodology proposed to be undertaken within the Offshore EIAR?
9. Are there any model specific parameters that you would advise us to use? Additionally, do you agree with the proposed modelling approaches (CRM – specific discussion on gannet avoidance rates, displacement matrices – alternative rates for auk species/SeabORD, apportioning, and PVA), including the points raised under Sections 4.4, 5.3, and 6.1 of Appendix 1?
10. Do you agree that the designed in mitigation measures described (Section 6.8.4) provide a suitable means for managing and mitigating the relevant potential effects of the Offshore Project on Marine and Intertidal Ornithology receptors?
11. Can consultees provide any additional survey or contextual information that could help inform the assessment, including tagging study data?

6.8.8. REFERENCES

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6.9. MARINE AND INTERTIDAL ARCHAEOLOGY

6.9.1. INTRODUCTION

This chapter of the Offshore Scoping Report provides an overview of the baseline environment for Marine and Intertidal Archaeology and Cultural Heritage (MIACH) within the vicinity of the Array Area and Offshore Cable Corridor Area of Search. It also includes a scoping assessment of likely significant effects for the relevant receptors, from the construction, operation (including maintenance), and decommissioning phases of the Offshore Project.

The MIACH chapter should be considered alongside the following complimentary chapters: Chapter 6.1: Physical and Coastal Processes; and Chapter 6.14: Seascape Landscape and Visual (SLVIA).

6.9.2. STUDY AREA

The MIACH Study Area consists of two elements, both have been defined below and are displayed in Figure 6.9-1.

The MIACH Offshore Study Area is defined by a 1 km buffer from the Array Area and Offshore Cable Corridor Area of Search, with limited overlap onshore (up to MHWS). This was defined to identify the known archaeology and enable further understanding of the archaeological potential of the area, which may lead to currently unknown assets.

The MIACH Setting Study Area is defined by an initial 60 km buffer from the Array Area (linked to the SLVIA Study Area), extending onshore (above MHWS). If required, RCS(s) will be located along the offshore export cable route. As the precise location(s) of RCS(s) are not yet known, these have been excluded from the MIACH Setting Study Area at the scoping stage. If the need for RCS(s) is confirmed as the Offshore Project design matures during the consenting process, it is proposed a 20 km buffer is applied to RCS location(s) and added to the MIACH Study Area defined above for assessment within the EIA. Data sources and receptors would be re-considered to account for the additional study area if required.

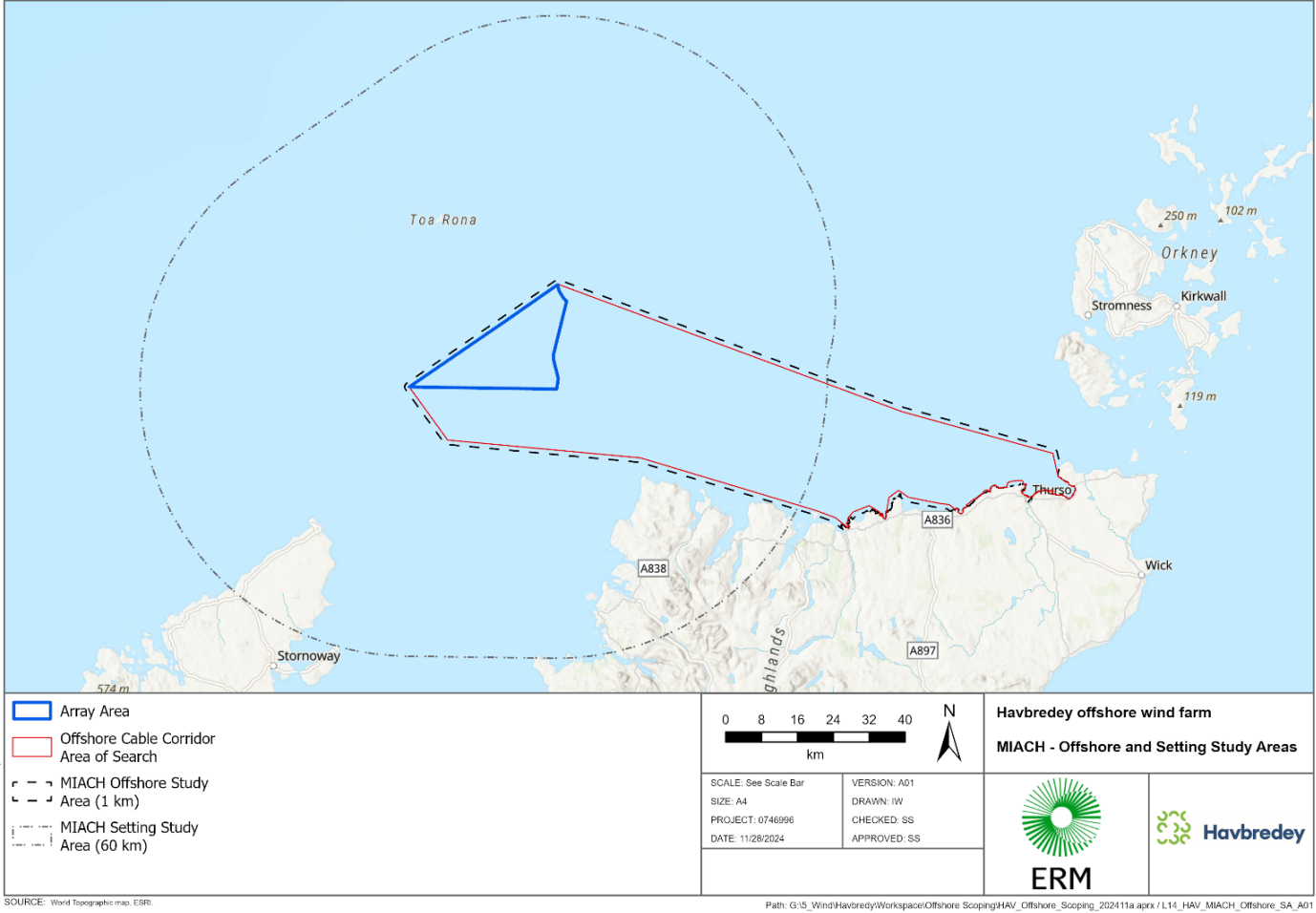



Figure 6.9-1 MIACH Study Area

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6.9.3. BASELINE ENVIRONMENT

6.9.3.1. Data Sources


Data sources used to inform this MIACH Chapter of the Offshore Scoping Report are presented in Table 6.9-1.

Table 6.9-1 Summary of Key Data Sources for MIACH

Source	Spatial Coverage	Year	Summary
HES	Scotland	2024 (with ongoing updates)	The HES Data Portal (https://portal.historicenvironment.scot/asPle) presents designated asset locations and descriptions
The National Record of the Historic Environment (NRHE) of Scotland	Scotland	2024 (with ongoing updates)	Canmore (https://canmore.org.uk/) and Pastmap database (http://pastmap.org.uk/). HES is the author. This source provides non-designated asset locations and descriptions
UKHO wreck register & nautical charts	UK	2024 (with ongoing updates)	The Admiralty Marine Data Portal. UKHO is the author. This source provides non-designated shipwreck and obstruction locations and descriptions
National Marine Plan interactive (NMPi) Part of Scotland's environment Interactive Viewer	Scotland	2024 (with ongoing updates)	Sites and vessels designated under the Protection of Military Remains Act 1986 ("war graves") - protected wrecks layer. UKHO is the Author. NMPi is Marine Scotland's on-line portal to provide spatial information and data to support national and regional marine planning and the state of the sea assessments required to support national and regional planning
Wreck Site EU	Worldwide	2024 (with ongoing updates)	This is an online wreck database open to the public for submitting entries (www.wrecksite.eu)

6.9.3.2. Overview of the Baseline Environment

Supporting this Offshore Scoping Report, an initial desk-based review of literature and available data sources (see Table 6.9-1) has been undertaken; the findings are presented below, to provide an understanding of the baseline environment for MIACH.

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6.9.3.3. Prehistory

Hominids and humans have occupied the UKCS at various times for more than 700,000 years but finds confirming this are rare. Using an understanding of submerged landscapes as a proxy for where human beings and early Hominids previously may have lived or hunted on as terrain, or where they exploited fish and shellfish on the coast, which may now be submerged (noting some Palaeocoastlines are above current sea level). Any onshore sites may also indicate potential for presence. While there is a long history of Hominid activity in the UK generally, the earliest evidence in a Scottish context dates to c. 14 ka BP (Ward and Saville, 2010).


North of mainland Scotland, the seabed has been subject to erosive forces from the glacial cycles, with a number of glacial features present (see the Chapter 6.1 : Physical and Coastal Processes). Some pockets of Holocene marine sediments may have survived and there are a number of bays along the coastline, which may have some preservation potential.

There is no known available evidence of submerged Palaeolandscapes of interest within the MIACH Offshore Study Area. Current research indicates that whilst there is some potential for submerged Holocene sediments, there is potential for prehistoric remains to survive, but the chances of survival are low due to the aforementioned erosive forces of the glacial cycles (Bicket and Tizzard 2015; Dawson et al. 2017; Flemming 2004; Sturt 2013; ABPmer, 2010); nearshore, sheltered areas (gullies) or intertidal caves will be the main areas of potential.

6.9.3.4. Marine and Intertidal Archaeology

Maritime archaeology can be defined as evidence of *“human utilization of maritime space by boat, settlement, fishing, hunting, shipping and its attendant subcultures, such as pilotage, lighthouse and seamark maintenance”* (Westerdahl, 1992). Remains considered range from shipwrecks or other durable evidence such as cargos and ballast, to features including navigational aids, sailing marks, ports, harbours, and jetties. Maritime assets may also include intertidal and coastal features that do not specifically relate to a wreck or vessel site. These may include fish traps and other evidence of human interaction with the sea, or intertidal areas such as eroded remains from nearby coastal features or settlements, or other evidence of coastal use.

To gain an understanding of the marine and intertidal archaeological potential of the area, a review of shipwreck inventories and documentary sources may be completed, however these are usually biased towards the 18th century and later when more systematic reporting began. Therefore, there are few known historical records of wrecks from medieval or earlier periods. As a maritime nation with a reliance on marine based trade and exchange, and with the exploitation of marine resources from prehistoric times, there have been countless shipwrecks around UK waters from all periods, many of which remain unreported.

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The known coastal archaeological evidence suggests exploitation of the marine environment in the North Sea for fishing and transport purposes from prehistoric times, which suggests that additional unknown archaeological remains from these activities may be present in the region. The northern coast of Scotland was occupied by the Picts, from which Caithness derives its name from the Kingdom of Cat. Then the area was later inhabited by the seafaring Norse, from whom local names such as Thurso¹³ originated (Abella *et al.* 2024). These peoples, who continued to use the coastal routes, practiced maritime trade and commerce until it came under Scottish rule. In the 18th and 19th centuries herring fishing and trade was a major economic activity in the region. The historical maritime use of the region is reflected in the archaeological record by presence of known wrecks along the coastline and in open water within the MIACH Offshore and Setting Study Areas.

Due to the area’s long history of seafaring, there is potential for unknown, unrecorded vessels to have sunk in the general area over the centuries, although the likelihood of encountering wrecks dating before the 18th century is low (Wessex Archaeology, 2009).

6.9.3.5. Aviation


Marine aviation, in this context, includes civilian and military aircraft that have crashed, sunk or been scuttled under a body of water. Aviation technology has been available since the early 20th century, though air travel became more prevalent after World War I. During the inter-war years commercial air travel boomed, and during World War II the skies were dominated by military aircraft. After the war, commercial aviation steadily increased and improved; often for this type of archaeology the main periods are associated with major developments in aviation design including pre-1939, 1939-1945, and post-1945.

None of the current datasets identify the presence of any known sites of aviation wreckage within the MIACH Offshore Study Area. However, there is potential for further finds. Any currently unknown aviation wreck sites, where the aircraft was lost during military service, identified through investigations have the potential to be classed as a war grave, and as such will be automatically protected under the Protection of Military Remains Act.

6.9.3.6. Summary of Assets

Table 6.9-2 provides a preliminary list of designated and non-designated assets within the MIACH Offshore Study Area and a preliminary list of onshore assets within the MIACH Setting Study Area, further refinement of these assets will be undertaken during the compilation of the baseline for the Offshore EIAR.


¹³ Named after the Norse god of thunder, Thor.

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As the Offshore Project design develops during the pre-application phase, a refined cable route corridor will be selected. After this selection, the MIACH Offshore Study Area will be reduced in size which will result in refinements in the number of archaeology and cultural heritage assets being considered. Figure 6.9-2 shows the receptors locations relative to the Offshore Project.

Table 6.9-2 Summary of Assets Table

Designation	Type	Description
MIACH Offshore Study Area		
Designated assets:	Military Remains	3 potential locations of submerged War Graves were identified (UKHO ids 877 and 67081 the <i>HMS Bullen</i> bow section and stern section respectively, and UKHO 926 the <i>HMT Beech</i>).
	Scheduled monuments	The following designated assets are all located along the coast but extend beyond the MHWS into the MLWS. 5 Scheduled Monuments (SM5510- Brims Castle; SM2630- Scrabster Castle; and SM559- Holborn Head Fort, Scrabster; SM554 -Green Tullochs, broch & cairn 640m north-northwest of Borrowston Mains; SM13625 - Castletown Battery, battery 505m north of Tralorn).
	Listed buildings	7 Listed Buildings (LB14010- Castletown Castlehill Harbour and Boathouse; LB14010- Castletown Castlehill Harbour and Boathouse; LB14011- Castletown Icehouse; LB14955 - Scrabster Ice House and Adjoining Cottage; LB14955- Scrabster Ice House and Adjoining Cottage; LB14988- Sandside Harbour 1 And 2, Sandside and Fishing Store; LB14988 -Sandside Harbour 1 And 2, Sandside and Fishing Store).
	Historic MPAs	No Historic MPAs were identified within the MIACH Offshore Study Area.
Non-designated assets:	Prehistory	No previously identified evidence of submerged Palaeolandscapes were located but there remains potential for Palaeolandscape features in the area.
	Maritime Archaeology	The following assets were identified: <ul style="list-style-type: none"> 318 Canmore entries indicating the potential presence of submerged maritime craft or industrial elements.

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Designation	Type	Description
		<ul style="list-style-type: none"> 69 UKHO entries indicating the presence of live and dead submerged maritime craft, and areas of foul ground.
	Aviation	No previously identified aircraft were located during this preliminary search, however the potential for identifying unknown aircraft remains.
MIACH Setting Study Area		
Designated assets (without refinement)	Listed buildings	66 Listed buildings were identified in total and have the following grades: <ul style="list-style-type: none"> 10 grade A. 40 grade B. 16 grade C.
	Scheduled monuments	47 assets were identified.
	Historic MPAs	1 asset was identified: the Historic MPA 3 – Kinlochbervie.

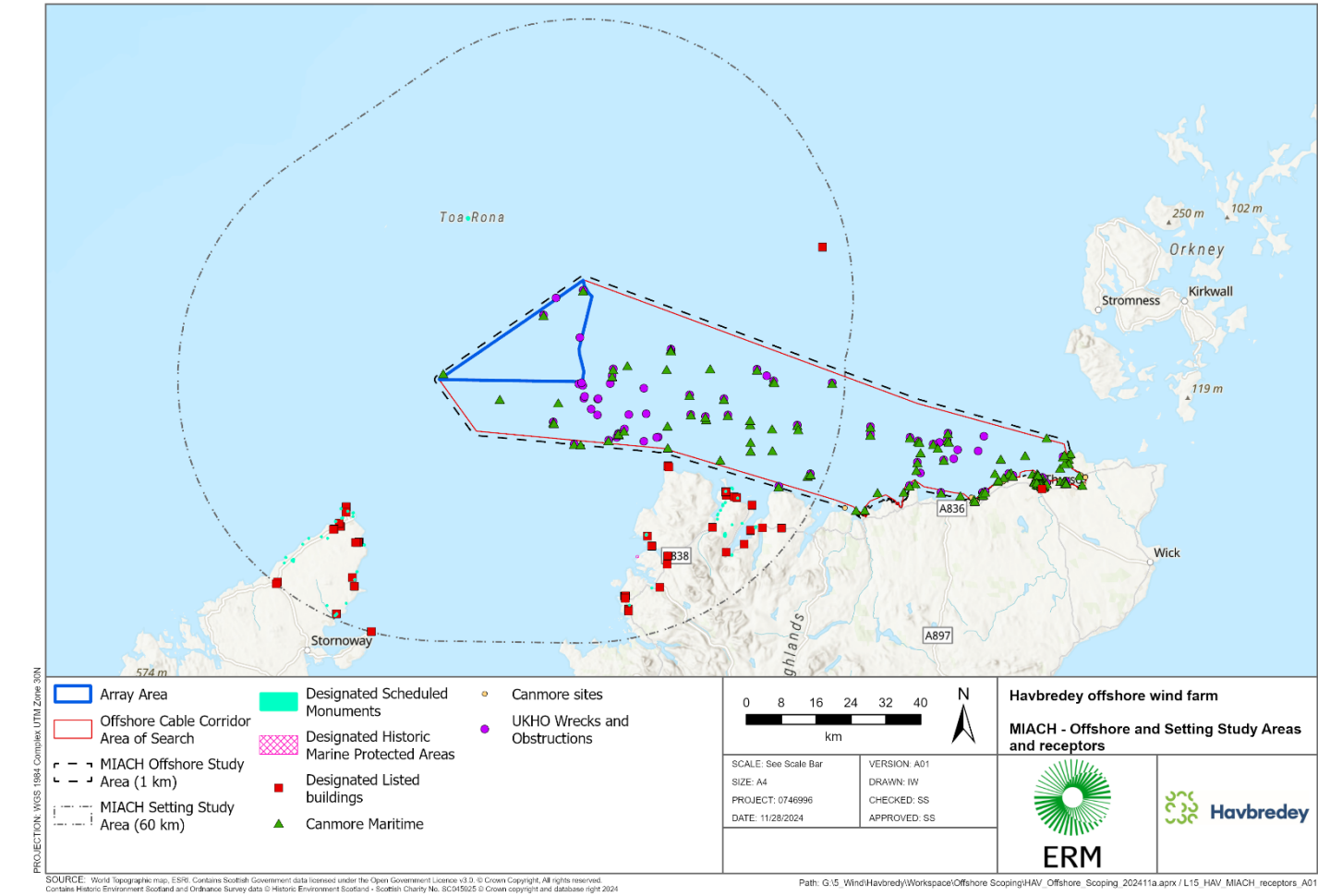



Figure 6.9-2 MIACH Receptors


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6.9.4. DESIGNED IN MITIGATION

The designed in mitigation measures relevant to the MIACH assessment, which have been incorporated into the current design of the Offshore Project, are outlined below in Table 6.9-3.

Table 6.9-3 MIACH Designed In Mitigation Measures

ID	Designed In Mitigation Measure	How the Measure Will Be Secured
ID013	Written Scheme of Investigations (WSI) and associated documents. A WSI will be prepared and submitted at the application stage. It will provide sufficient detail to avoid the need for further approval processes before construction begins, although updates may be made as required under licence and consent conditions during the operational phase. It will cover all phases of the Offshore Project that the licence and consent application relate to, making reference to the Project Protocol of Archaeological Discoveries (PAD).	Secured under Section 36 and Marine Licence consent conditions.
ID014	<p>Avoidance of known sites of archaeological significance through the use of Archaeological Exclusion Zones (AEZs), Temporary Exclusion Zones (TEZs) or Areas of Archaeological Interest (AAI) and micrositing. These sites for which avoidance is required will be listed in the WSI alongside detail of relevant AEZ/TEZs/AAI to inform the works.</p> <p>Micrositing will also be taken into consideration as part of the design and planning phase of the Offshore Project, to ensure that avoidance is undertaken where possible. Where micrositing is undertaken during the construction phase the process relating to avoidance, minimisation, and reduction of impacts to sites of archaeological significance will be followed as detailed in the WSI.</p>	Secured under Section 36 and/or Marine Licence consent conditions.
ID015	Identification of unknown sites of archaeological significance by completing a geophysical survey over the Offshore Project (as refined during the pre-application phase) and review of data by a suitably qualified archaeologist. If any potential sites are identified, avoidance through implementation of AEZs and micro siting of the offshore infrastructure will be undertaken, as required.	Secured under Section 36 and/or Marine Licence consent conditions.
ID016	Reporting and recording of items of potential archaeological interest via the production of a PAD.	Secured under Section 36 and Marine Licence consent conditions.

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6.9.5. SUMMARY OF KEY RECEPTORS, SENSITIVITIES AND LIKELY SIGNIFICANT EFFECTS

The key known and unknown receptors for MIACH include:

- Prehistoric assets (including Palaeolandscapes)
- Maritime and aviation assets
- Settings of designated onshore assets

6.9.5.1. Likely Significant Effects

The scoping of likely significant effects on MIACH receptors which may arise within the MIACH Offshore Study Area and MIACH Setting Study Area via the proposed Offshore Project, are outlined in Table 6.9-4.

6.9.5.2. Setting

“Setting” relates to the surroundings in which a heritage asset is understood, appreciated and experienced and is often integral to the asset’s cultural significance. The extent is dependent upon the asset and is not fixed, it may change and evolve and often extends beyond the asset’s boundary or individual ‘curtilage’ into a broader landscape context. Both tangible and less tangible elements may be important in understanding the Setting and need to be considered. Elements of a current asset’s Setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance, or may be neutral (Historic Environment Scotland, 2020).

Due to the location of submerged marine heritage assets being underwater, they have limited visual sensitivities. For these submerged assets, effects on the assets are assessed through other direct and indirect impacts. For assets on land that derive value from key views to the sea, Setting impacts may be possible. Moreover, impacts to an asset’s Setting are not dependent upon public accessibility, as such even privately owned or remote assets without public access can have their Settings impacted by development.


6.9.5.3. Direct Effects

Direct physical effects relate to physical changes to the material of the heritage asset, often as the result of damage or physical removal of the asset in question. These are often one-off impacts that are irreversible in nature. Sources of direct physical effects leading to impacts may include activities such as anchor damage from dropping anchors on the asset or physical destruction from trenching through the asset.

Direct effects relating to changes in the visual Setting of the heritage asset, often as a result of the construction of infrastructure can also occur. These tend to be either long-term or permanent.

6.9.5.4. Indirect Effects

Indirect physical effects relate to changes to the asset caused by changes to the surrounding environment which in turn effects the heritage assets. Sources of indirect physical effects that can lead to impacts may

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include covering the asset in sediments, or changes to the water quality in which the asset is located that effects the preservation of the asset from activities that cause scouring or pollution.




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Table 6.9-4 EIA Scoping Assessment for MIACH


Potential Impact	Scoping Result	Justification	Assessment Method
Construction and Decommissioning			
Direct physical impact (e.g. drilling, anchoring system construction or removal, seabed levelling, ploughing and cable lay, cable protection etc.)	In	The physical impact of or removal of an asset linked to any construction or decommissioning works on maritime, aviation, or prehistoric sites of known (identified through records and surveys) or unknown sites of archaeological potential. At present further information is needed to assess the impacts fully and confirm the appropriate mitigation.	A full review of the known and unknown assets that may be receptors for direct physical impact will be reviewed. Further request of local HER and datasets such as those identified in Table 6.9-1 will be undertaken as part of a desk-based assessment. Further information from site-specific surveys will be used to confirm the location of any assets prior to construction. An impact assessment will be undertaken to establish suitable and proportionate mitigation if necessary. These could include exclusion zones, and the creation of the WSI and PAD in consultation with MD-LOT and their consultees including HES.
Indirect physical impact (e.g. from suspended sediment, changes in current leading to scour/erosion or deposition, etc.)	In	The changes in the hydrodynamics and sediment distribution linked to the construction and decommissioning activities that may uncover or bury any maritime, aviation, or prehistoric sites of known (identified through records and surveys) or unknown sites of archaeological potential. At present further information is needed to assess	As per the above, an understanding of the surrounding known and unknown assets will be undertaken within the MIACH Offshore Study Area. Alongside the findings from the physical processes chapter (Chapter 6.1), an assessment will be undertaken to identify any pathways for the effects to impact any receptors. Suitable and proportionate mitigation will be proposed if necessary and confirmed in consultation with MD-LOT and their consultees.

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Potential Impact	Scoping Result	Justification	Assessment Method
		the impacts fully and confirm the appropriate mitigation.	
Direct impact (visual) (e.g. from above sea surface infrastructure and construction/decommissioning related equipment) on heritage assets	Out	Offshore heritage assets, due to their location underwater, have limited visual sensitivities from the Offshore Project and are therefore scoped out of the assessment. For onshore assets, the effects of the construction and decommissioning of the offshore infrastructure will be temporary in nature and are likely to be equal to or less than effects during the operational and maintenance phase Therefore, this has been scoped out of the Offshore EIAR.	N/A
Operation and Maintenance			
Direct physical impact (e.g. repairs, debris, additional cable protection)	In	The physical impact of any maintenance works on maritime, aviation, or prehistoric sites of known (identified through records and surveys) or unknown sites of archaeological	A desk-based assessment and site-specific surveys prior to construction will enable identification of the known and unknown assets. Alongside the Offshore Project design, an impact assessment will be undertaken to identify impact pathways and effect significance. A WSI and PAD will be in

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Potential Impact	Scoping Result	Justification	Assessment Method
		potential. At present further information is needed to assess the impacts fully and confirm the appropriate mitigation.	place during the Offshore Project. Suitable and proportionate mitigation will be proposed where appropriate and confirmed in consultation with MD-LOT and their consultees.
Indirect physical impact (e.g. burial or scour/erosion)	In	The changes in the hydrodynamics and sediment distribution linked to operations and maintenance activities that may uncover or bury any maritime, aviation, or prehistoric sites of known (identified through records and surveys) or unknown sites of archaeological potential. At present further information is needed to assess the impacts fully and confirm the appropriate mitigation.	As per the above, an understanding of the surrounding known and unknown assets will be undertaken using the MIACH Offshore Study Area. Alongside the findings from the physical processes chapter (Chapter 6.1), an assessment will be undertaken to identify any pathways for the effects to impact any receptors, as well as the effect. significance. A WSI and PAD will be in place during the Offshore Project. Where needed, suitable and proportionate mitigation will be proposed and confirmed in consultation with MD-LOT and their consultees.
Direct impact (visual) (e.g. from above sea surface infrastructure) on offshore heritage assets	Out	Offshore heritage assets, due to their location underwater, have limited visual sensitivities from the Offshore Project and are proposed to be scoped out of the impact assessment.	Offshore assets will be discussed, however there is limited visual sensitivity associated due to their location. Any intertidal assets may be included as part of the onshore assessment, where identified to have an associated Setting.
Direct impact (visual) (e.g. from above sea surface infrastructure)	In	Onshore assets (down to MLWS) will be assessed for visual intrusion caused by conspicuous and uncharacteristic	An initial ZTV will be confirmed, in line with the SLVIA chapter (Chapter 6.14) (proposed MIACH Setting Study Area). Refinement using findings from a digital or in person (where

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Potential Impact	Scoping Result	Justification	Assessment Method
on onshore (and intertidal) heritage assets		structures that may detract from the value the asset derives from its Setting. At present further information is needed to assess the impacts fully and confirm the appropriate mitigation.	possible and practical) walkover survey with photo-documentation data, and details such as topography, infrastructure heights, etc. are then used to model the distances at which the Offshore Project will be visible. Assets, either as individuals or grouped, will be assessed and where assets that derive value from their Setting, and have sensitivities that warrant investigation as determined by a qualified archaeologist in consultation with relevant consultees, such as HES, a Setting assessment will be completed. Where required, potential proportionate and suitable mitigations will be recommended.

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6.9.6. PROPOSED APPROACH TO EIA

The proposed approach to the impact assessment will take the following steps:

- To characterise the site and to identify specific assets linked to the main receptors:
 - Gathering of baseline data (primary or site-specific survey where available for the Offshore EIAR and appropriate, desk-based etc.) and assessing significance
 - For Settings, generation and confirmation of ZTV, sieving of the assets and Setting review
- Refinement of potential impact pathways
- Assessment of impacts
- Identification of any additional mitigation measures if likely significant effects concluded

6.9.6.1. Relevant Data Sources

Data sources listed within Table 6.9-1, alongside further secondary data sources including published and unpublished papers, journals and reports will be used to inform the EIA including data purchased from the Highland Council HER, Receiver of Wreck records, and further survey works where available and appropriate. These sources may be further supplemented by any additional material identified during stakeholder consultation.

6.9.6.2. Consultation

Consultation and engagement will be key to confirm the methodology and approach to the assessment. Throughout the duration of the Offshore Project, collaboration between the Offshore Project team and external stakeholders will be established. Organisations that will be consulted with respect to this specific EIA topic, include:

- MD-LOT
- NatureScot
- HES
- Orkney Islands Council, The Highland Council and Comhairle nan Eilean Siar


Local groups and/or representatives may also be included as part of the consultation.

6.9.6.3. Policy, Legislation and Guidance

The assessment of MIACH will consider the legislation, policy and guidance listed below (Table 6.9-5).

Table 6.9-5 Legislation, Policy and Guidance Relevant to the MIACH Assessment.

Relevant Legislation, Policy and Guidance
Legislation and Policy
The United Nations Convention of the Law of the Sea (UNCLOS)

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Relevant Legislation, Policy and Guidance

International Council on Monuments and Sites (ICOMOS)

The European Convention on the Protection of the Archaeological Heritage (revised), known as the Valletta Convention

Annex to the United Nations Educational, Scientific, and Cultural Organisation (UNESCO) Convention on the Protection of the Underwater Cultural Heritage 2001

Protection of Wrecks Act 1973

Ancient Monuments and Archaeological Areas Act 1979

The Protection of Military Remains Act 1986

Merchant Shipping Act 1995

Marine (Scotland) Act 2010

Treasure Trove Law (as revised Jan 2016; applicable to MLWS)

Scotland's National Marine Plan: A Single Framework for Managing Our Seas (March 2015)

The Historic Environment Strategy for Scotland (Historic Environment Scotland, 2022)

Guidance

Marine licensing and consenting: offshore renewable energy projects. Written Scheme of Investigation and Protocol for Archaeological Discoveries. (Marine Directorate, 2025)

COWRIE Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology, 2007)

COWRIE Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore renewable Energy (COWRIE, 2008)

Code of Practice for Seabed Development (Joint Nautical Archaeology Policy Committee and The Crown Estate, 2008)

COWRIE Guidance for Offshore Geotechnical Investigations and Historic Environment Analysis: guidance for the renewable energy sector (Gribble and Leather, 2011)

Assessing Boats and Ships 1860-1913, 1914-1938 and 1939-1950. Archaeological Desk-Based Assessments in 3 volumes (Wessex Archaeology. 2011)


Protocol for Archaeological Discoveries: Offshore Renewables Projects (The Crown Estate, 2014)

The Chartered Institute for Archaeologists Codes, Standards and Guidance (various)

Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland (Scottish Natural Heritage & Historic Environment Scotland, 2018)

Managing Change in the Historic Environment Guidance Series: Setting (Historic Environment Scotland, 2020b (revised))

Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate, 2021)

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6.9.6.4. Assessment Methodology

The assessment will follow the methodology described in Chapter 4: Proposed Approach of EIA. Further refinement of the methodology and the MIACH Offshore and Setting Study Areas will be undertaken prior to the chapter being written as part of the baseline and stakeholder engagement. Cumulative and transboundary effects are also discussed in Chapter 4: Proposed Approach to EIA, and assessment of these will apply to MIACH.


The main aim of the MIACH assessment is to characterise and understand the baseline within the MIACH Offshore and Setting Study Areas, particularly with respect to any known and unknown sites of archaeological interest, these may include:

- Maritime/Aviation:
 - Wreck site
 - Debris area
 - Individual items
 - Intertidal sites
- Prehistoric remains and Palaeolandscapes, which may provide insight into early Holocene and post-agricultural revolution narratives
- Setting of assets onshore with key views towards the Offshore Project

Understanding the known heritage resource and the potential for unknown and buried remains to inform the baseline is key, along with comprehension of the physical processes, infrastructure, layout, and installation methods, the resulting potential pressure pathways will then be used to inform the assessment.

The assessment will consider the sensitivity of the receptors, noting the potential scarcity of the types of receptors, and the magnitude of the effect, and further noting that there is no/limited recoverability of archaeological receptors, combining the results to provide an assessment of effect significance. An assessment of the likely significant effects of the Offshore Project will be undertaken through application of the evidence base. Designed in mitigation will be considered within the assessment, and further mitigation recommended, where required. Should cumulative effects arise from the Offshore Project at specific receptors these will be considered within the cumulative effects section of the Offshore EIAR.

Stakeholder consultation will be undertaken at pivotal points throughout the EIA process to ensure that the approach, including the collection of the base evidence, satisfies the requirements of both stakeholders and regulators, such as after scoping, prior to commencement, and at draft production of the chapter during the Offshore EIAR.

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6.9.7. SCOPING QUESTIONS FOR CONSULTEES

Scoping questions for consultees in relation to the MIACH assessment include:

1. Do you agree that the data sources referenced above to inform the baseline are valid and sufficient for the purposes of this scoping assessment?
2. Can consultees provide details or any current or recent marine cultural heritage and archaeology records, works, or projects within or in the vicinity of the Offshore Project, which may not yet be in the public domain?
3. Have all MIACH receptors and potential impacts that could result from the Offshore Project been identified?
4. Do you agree with the assessment methodology proposed to be undertaken within the Offshore EIAR?
5. Do you agree with the proposed approach to assessment (scoped in) for each of the impacts for MIACH? Are there any other potential effects that you believe could be significant and which you wish to see assessed in the MIACH Chapter of the Offshore EIAR for the Offshore Project?
6. Do you agree that the designed in mitigation measures described provide a suitable means for managing and mitigating the relevant potential effects of the Offshore Project MIACH receptors?
7. Do you agree with the methodology for the Settings assessment, as an initial broad MIACH Setting Study Area of 60 km (in line with the SLVIA Study Area), which will be further refined using the local terrain and visual aspects including a zone of theoretical visibility, and further refined using a sieving assessment?

6.9.8. REFERENCES


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6.10. COMMERCIAL FISHERIES

6.10.1. INTRODUCTION

This chapter of the Offshore Scoping Report provides an overview of the baseline environment for commercial fisheries within the Array Area and Offshore Cable Corridor Area of Search. It also includes a scoping assessment of likely significant effects for the relevant receptors, from the construction, operation (including maintenance), and decommissioning phases of the Offshore Project.

Socio-economic impacts, including those on commercial fishing, are considered in Chapter 6.16: Socio-economics and where required will be cross referenced in the Offshore EIAR. Impacts on commercial fish species are considered in in this chapter, however, further information on the species can be found in Chapter 6.6: Fish and Shellfish Ecology.

6.10.2. STUDY AREA

The Commercial Fisheries Study Area has been defined on the basis of commercial fisheries activity in relation to ICES Statistical Rectangles. Seven ICES rectangles are located within the proposed Commercial Fisheries Study Area, including 46E3, 46E4, 46E5, 46E6, 47E3, 47E4, and 47E5 as shown in Figure 6.10-1. The ICES rectangles interact with the Offshore Project as follows:

- 46E4 and 47E4: the Array Area overlaps a part of each of these rectangles covering approximately 390 km² of 3,223 km² of the ICES rectangle 46E4 (12.10%), and approximately 0.01 km² of 3,177 km² (<0.01%) of 47E4
- 46E5 and 46E6: these rectangles cover the Offshore Cable Corridor Area of Search and provide a buffer
- 46E3, 47E3 and 47E5: these rectangles are within the vicinity of the Offshore Project with no direct overlap

The inshore areas of the Commercial Fisheries Study Area overlap with a number of RIFG, including the Outer Hebrides RIFG, the North West Coast RIFG, the Orkney RIFG and the North East Coast RIFG, as outlined in Figure 6.10-2.

The scoping design envelope extends to MHWS meaning impacts from offshore infrastructure are only considered for receptors below MHWS. It should be noted that the topic-specific study area will vary depending on the nature and scale of each receptor, or associated pathway, that could result in a receptor effect.

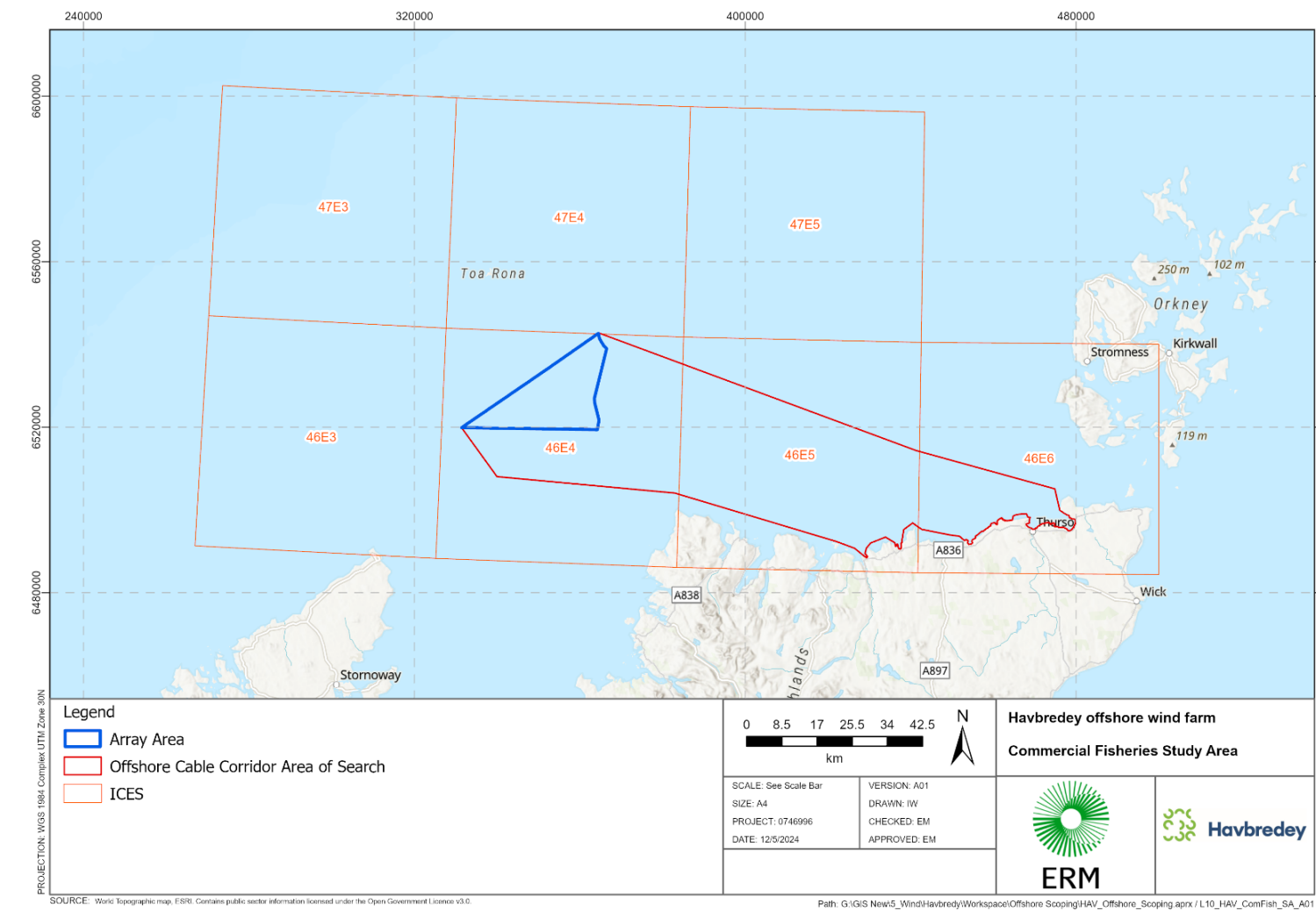


Figure 6.10-1 Commercial Fisheries Study Area

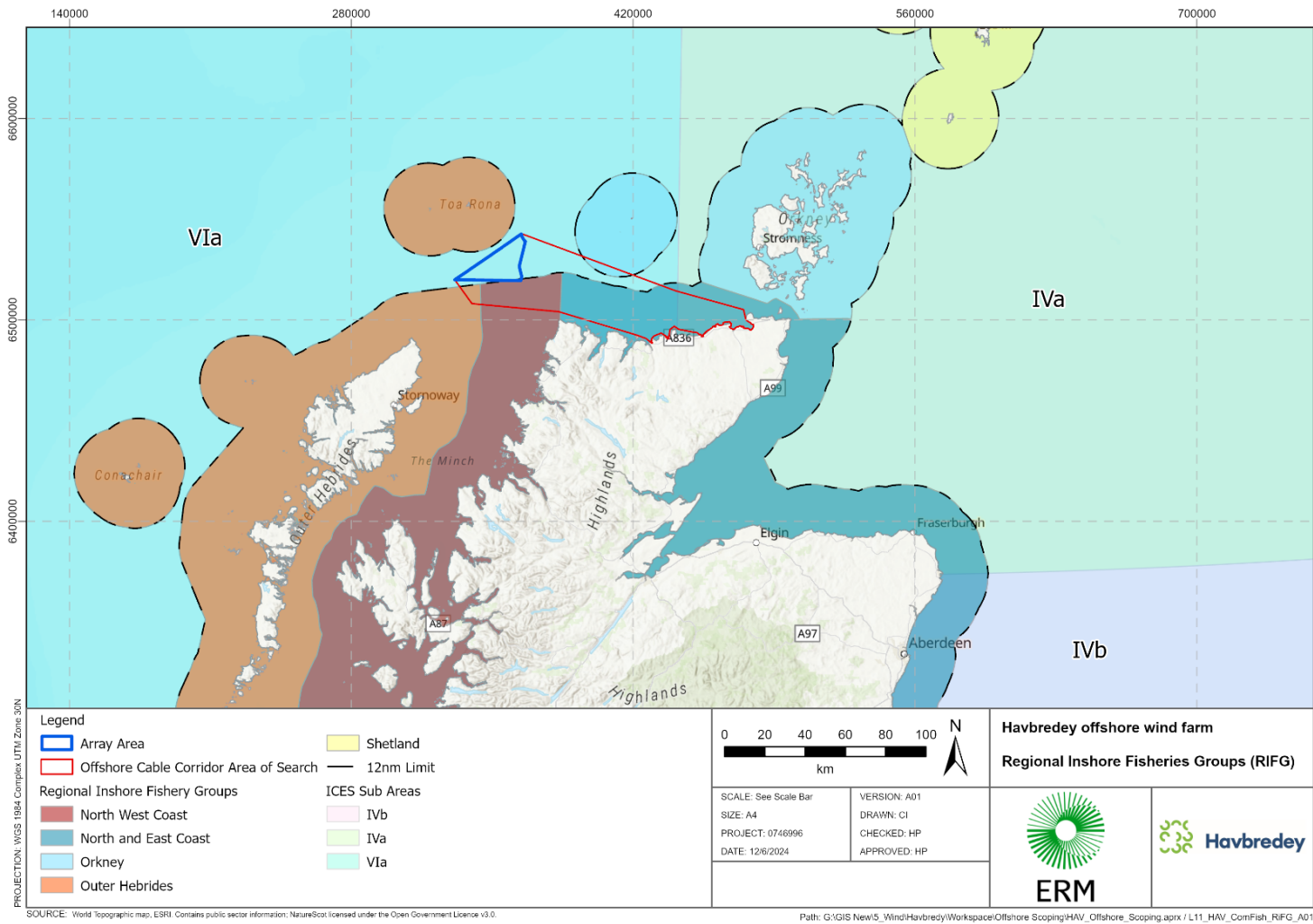



Figure 6.10-2 Regional Inshore Fisheries Groups (RIFG)

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6.10.3. BASELINE ENVIRONMENT

6.10.3.1.Data Sources

Data sources used to inform this Commercial Fisheries Chapter of the Offshore Scoping Report are presented in Table 6.10-1. Following feedback provided during the Commercial Fisheries Scoping Workshop, the data used to inform this Offshore Scoping Report has been increased from 5 to 10 years of data, where available. Further data sets will be considered as part of the Offshore EIAR, where appropriate, and in discussion with fisheries stakeholders (see Section 6.10.6).


Table 6.10-1 Summary of Key Data Sources for Commercial Fisheries

Source	Spatial Coverage	Year	Summary
EMODnet (2023)	Europe	2018-2021	Average Fishing Intensity categorised by ICES Rectangles, for vessels > 12m (VMS) or various types
MMO (2024)	UK	2019-2023	UK fleet landings by rectangle, stock, port and EEZ 2019-2023
MMO (2018a)	UK	2014-2018	2014 to 2018 UK fleet landings and foreign fleet landings into the UK by port
MMO (2018b)	UK	2014-2018	2014 to 2018 UK fleet landings by ICES rectangle
Marine Scotland Vessel Monitoring System (VMS) Average intensity of fishing data, Scottish Government	Scotland	2010-2020	VMS Fishing Intensity – Average intensity (hours) of fishing with bottom trawls, Nephrops and dredges 2010-2020

There are some limitations to the MMO datasets utilised to determine the overview of the baseline environment. The categorisation of gear types has been grouped differently between 2014-2023, specifically, the categorisation of pelagic and demersal gear types. The 2014-2018 dataset groups pelagic gears under 'Demersal trawl/seine', whereas the 2019-2023 dataset has a separate grouping for pelagic trawls alone. This should be considered when interpreting the report where pelagic species are associated with 'Demersal trawl/seine' gear types.

6.10.3.2. Overview of the Baseline Environment

Supporting this Offshore Scoping Report, an initial desk-based review of literature and available data sources (see Table 6.10-1) has been undertaken; the findings are presented below, to provide an understanding of the baseline environment for Commercial Fisheries.

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Based on an initial review of available data undertaken to inform this Offshore Scoping Report, the fishing activities within the Regional Commercial Fisheries Study Area are summarised below. The findings are based on analysis of landings values (£) per species as provided in the datasets provided by the MMO (UK fleet landings by rectangle, stock, port and EEZ 2014-2023 (MMO, 2024 and MMO, 2018b)); and VMS density mapping to assess transiting of fishing activity (Scottish Government, 2023).

Annual landed weights from ICES Rectangles 46E3, 46E4, 46E5, 46E6, 47E3, 47E4, and 47E5 ranged between 238 tonnes to 39,153 tonnes throughout the study period, as established across 2014-2023 (see Figure 6.10-3 (MMO, 2024 & MMO, 2018b) and Table 6.10-2). ICES Rectangle 47E4 showed the greatest variability between years, peaking during 2017 at 39,153 tonnes, and falling to a minimum landed weight of 449 tonnes in 2020.

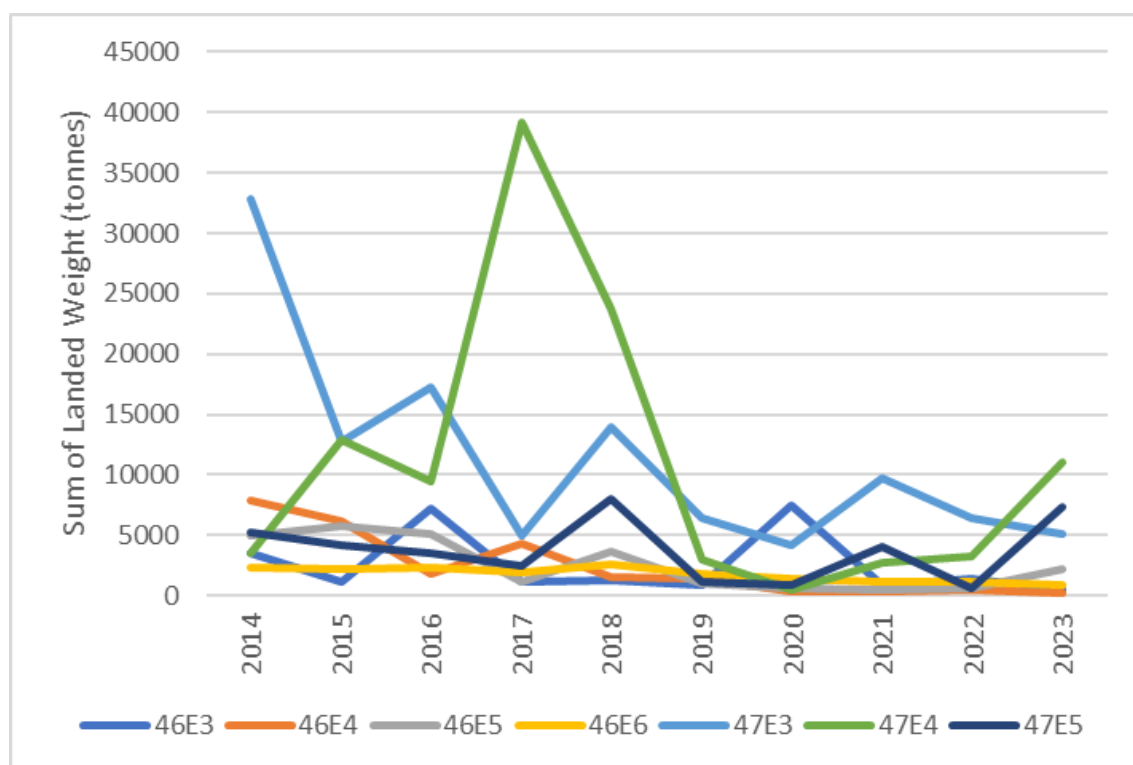


Figure 6.10-3 Landed Weight (tonnes) during the Study Period for each ICES Rectangle within the Commercial Fisheries Study Area



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Table 6.10-2 Landed Weight (tonnes) during the Study Period for each ICES Rectangle within the Commercial Fisheries Study Area

ICES Rectangle	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total Value
46E3	3,545	1,144	7,220	1,114	1,294	935	7,425	928	1,454	532	25,592
46E4	7,829	6,103	1,812	4,315	1,525	1,373	370	409	531	238	24,503
46E5	4,986	5,709	5,155	1,089	3,687	976	584	488	567	2,193	25,434
46E6	2,315	2,251	2,265	1,931	2,540	1,842	1,377	1,096	1,132	860	17,611
47E3	32,848	12,764	17,194	4,964	13,981	6,364	4,218	9,672	6,399	5,046	113,452
47E4	3,545	12,906	9,504	39,153	23,730	2,998	449	2,769	3,272	11,094	109,420
47E5	5,278	4,173	3,509	2,467	8,057	1,162	936	4,040	580	7,329	37,532

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Landed values exhibited a corresponding trend to that of landed weights, as per Figure 6.10-4 and Table 6.10-3.

Landings data per ICES rectangle within the Commercial Fisheries Study Area for the period of 2014-2023 can be summarised as follows:

- ICES Rectangle 47E3, located outside of both the Array Area and Offshore Cable Corridor Area of Search, attained both the highest landed weight and landed value of all ICES Rectangles within the Commercial Fisheries Study Area, reaching a total of 113,452 tonnes and over £125 million in value, across the study period
- ICES Rectangle 46E6, which largely encompasses the proposed Landfall Area of Search, attains the lowest total landed weight (17,611 tonnes) of all ICES Rectangles within the Commercial Fisheries Study Area, across the study period
- ICES Rectangle 46E4, which largely encompasses the Array Area, attains the lowest total landed value (£19,069,856) of all ICES Rectangles within the Commercial Fisheries Study Area, across the study period
- The Array Area partially overlaps with ICES Rectangle 47E4 (approximately 0.01 km² (<0.01%) of the ICES Rectangle), which attains the second highest total landed weight (109,420 tonnes) and total landed value (£103,338,658) across the study period
- ICES Rectangle 46E4 which largely encompasses the proposed Array Area, attains a substantially lower total landed weight (24,503 tonnes) and total landed value (£19,069,856) in comparison to ICES 47E4, across the study period

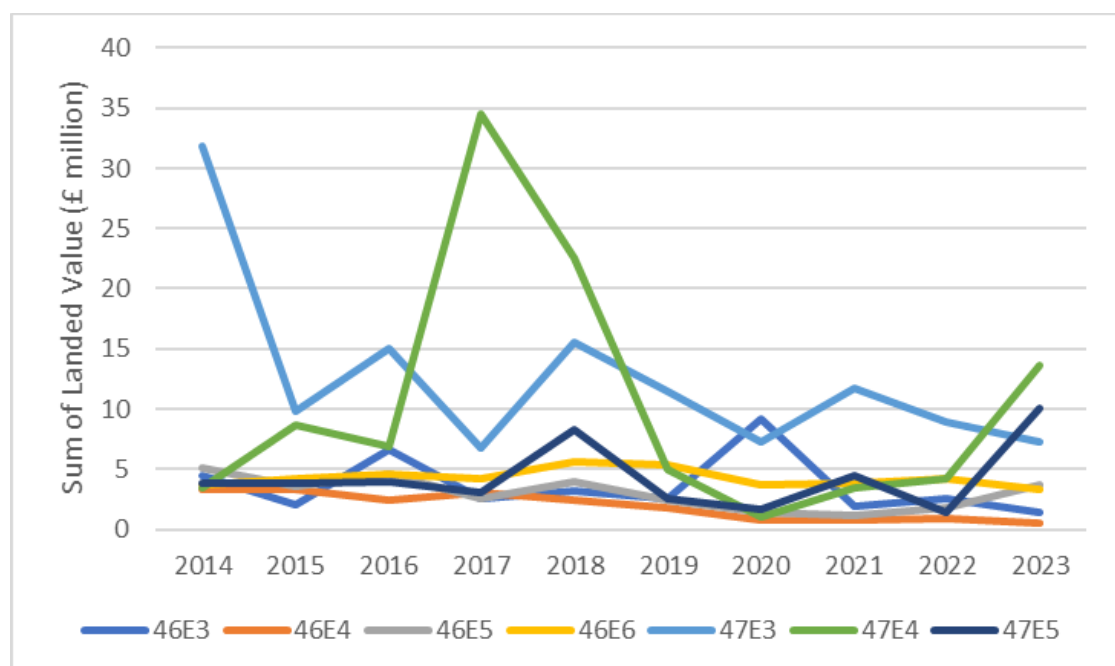


Figure 6.10-4 Value of Landings (£) during the Study Period for each ICES Rectangle within the Commercial Fisheries Study Area



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Table 6.10-3 Value of Landings (£) during the Study Period for each ICES Rectangle within the Commercial Fisheries Study Area

ICES	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total Value
46E3	443,0453	2,043,905	6,646,188	2,544,062	3,235,149	2,541,104	9,181,166	1,963,655	2,579,721	1,445,685	36,611,090
46E4	3,363,972	3,321,072	2,381,632	3,009,431	2,377,221	1,723,986	708,605	805,847	843,983	534,109	19,069,856
46E5	5,063,654	3,562,373	4,605,273	2,521,036	3,955,402	2447656	1,349,425	1,155,455	1,821,769	3,649,269	30,131,312
46E6	3,744,415	4,157,372	4,623,185	4,247,530	5,632,670	5,325,039	3,699,617	3,768,839	4,227,256	3,327,783	42,753,706
47E3	31,822,612	9,764,619	15,036,440	6,722,933	15,512,802	11,435,471	7,200,531	11,691,811	8,887,566	7,286,779	125,361,564
47E4	3,404,693	8,631,893	6,883,420	34,493,712	22,554,580	4,980,342	1,012,416	3,439,128	4,263,793	13,674,682	103,338,658
47E5	3,768,916	3,779,269	3,932,116	3,079,828	8,335,282	2,540,498	1,634,264	4,493,246	1,383,621	10,048,922	42,995,961

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The main landing ports within the Commercial Fisheries Study Area are located at Peterhead approximately 129 km southeast of the Offshore Cable Corridor Area of Search; Scrabster, located approximately 2 km northwest of Thurso within the Offshore Cable Corridor Area of Search; and Kinlochbervie, located approximately 30 km south of the Offshore Cable Corridor Area of Search. Data from smaller ports that receive landings from vessels fishing within the Commercial Fisheries Study Area have also been considered within this chapter, including Stromness, Egersund, Ullapool, Lochinver, Ellingsoy, Vlissengen and Alesund. Figure 6.10-5 highlights both the landed value and landed weights of each port across all ICES Rectangles within the Commercial Fisheries Study Area, between 2019-2023. The MMO landings data utilised to quantify the main landing ports within the Commercial Fisheries Study Area were limited to the period between 2019-2023 due to lack of available data sources relating to the ICES Rectangles used to determine the Commercial Fisheries Study Area prior to this period.

The only fishing restrictions in place within the Commercial Fisheries Study Area is the Dounreay Food Protection Agency (FEPA) closure (Figure 6.10-6). This area is designated under The Food Protection (Emergency Prohibitions) (Dounreay Nuclear Establishment) Order 1997. This Order prohibits fishing of any species by all gear types within this area.

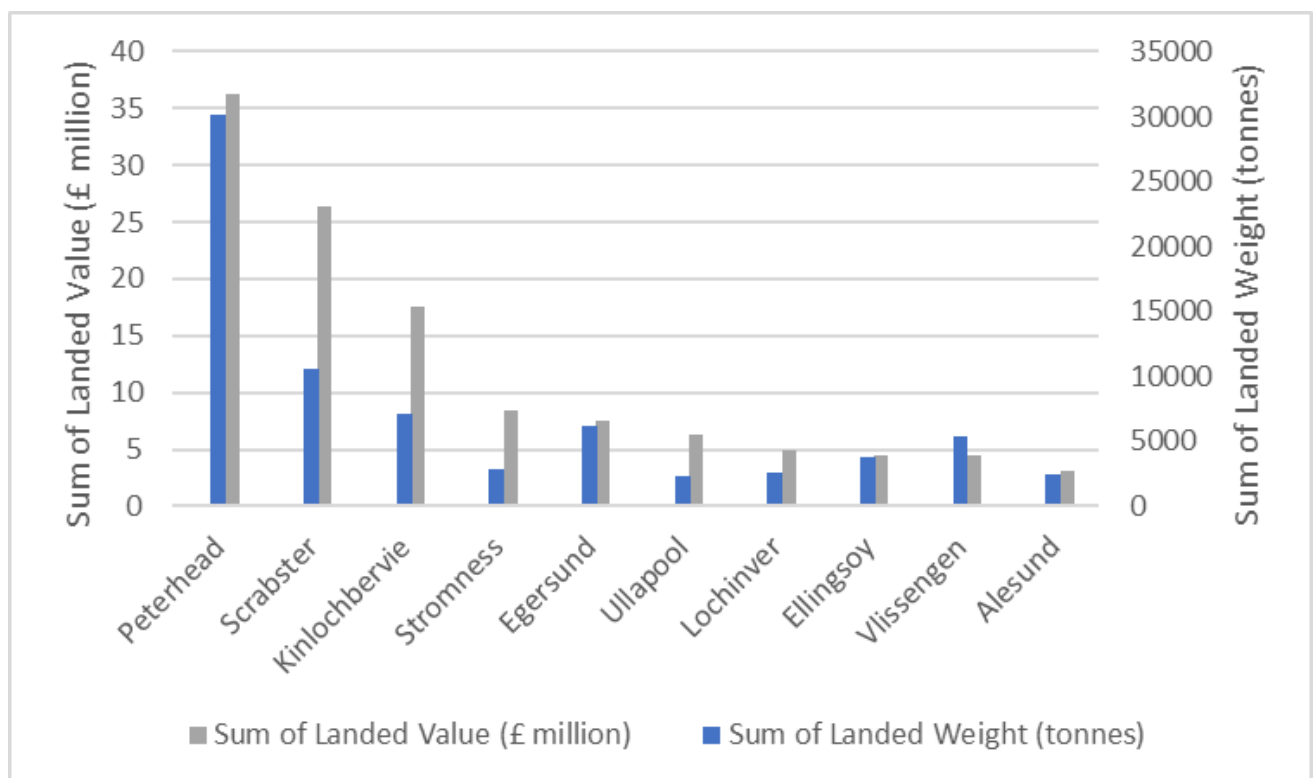


Figure 6.10-5 Landed Value (£ million) and Landed Weight (tonnes) of the Top 10 Ports of Landings during 2019-2023 for all ICES Rectangles within the Commercial Fisheries Study Area

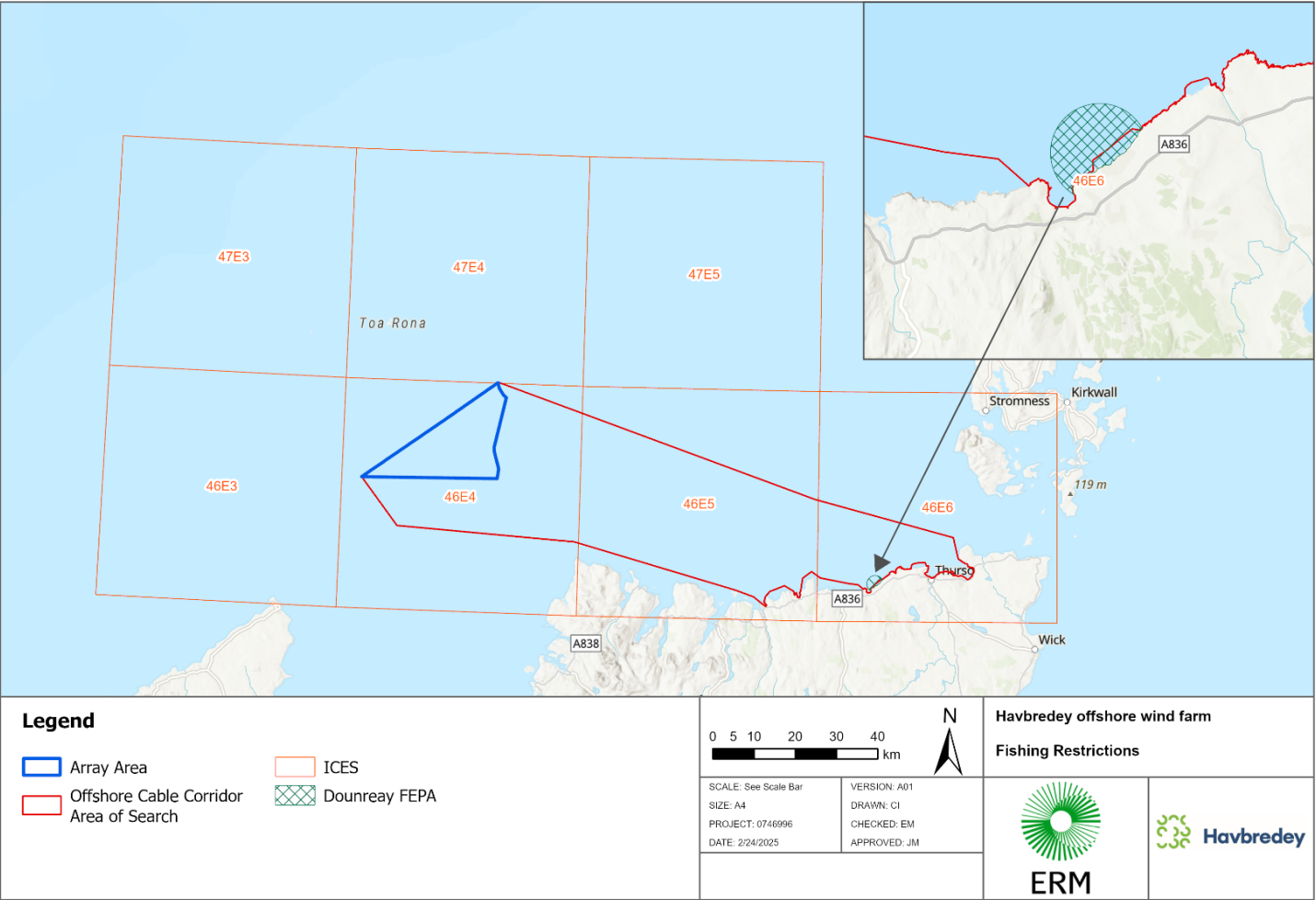



Figure 6.10-6 Dounreay Food Protection Agency (FEPA) closure within the Commercial Fisheries Study Area

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The top ten commercial fish species landed within the Commercial Fisheries Study Area during the study period, are outlined in Figure 6.10-7. Mackerel attains the largest landed weight out of all species, with a total of 243,507 tonnes across the study period, which is largely due to fishing effort in 2014, 2017 and 2018. Mackerel are a mobile pelagic species that is influenced by environmental conditions affecting fish stock abundance and as such is targeted by highly nomadic fleets, as demonstrated by the yearly variation in landings. The other 9 species attain a substantially lower total landed weight within the Commercial Fisheries Study Area.

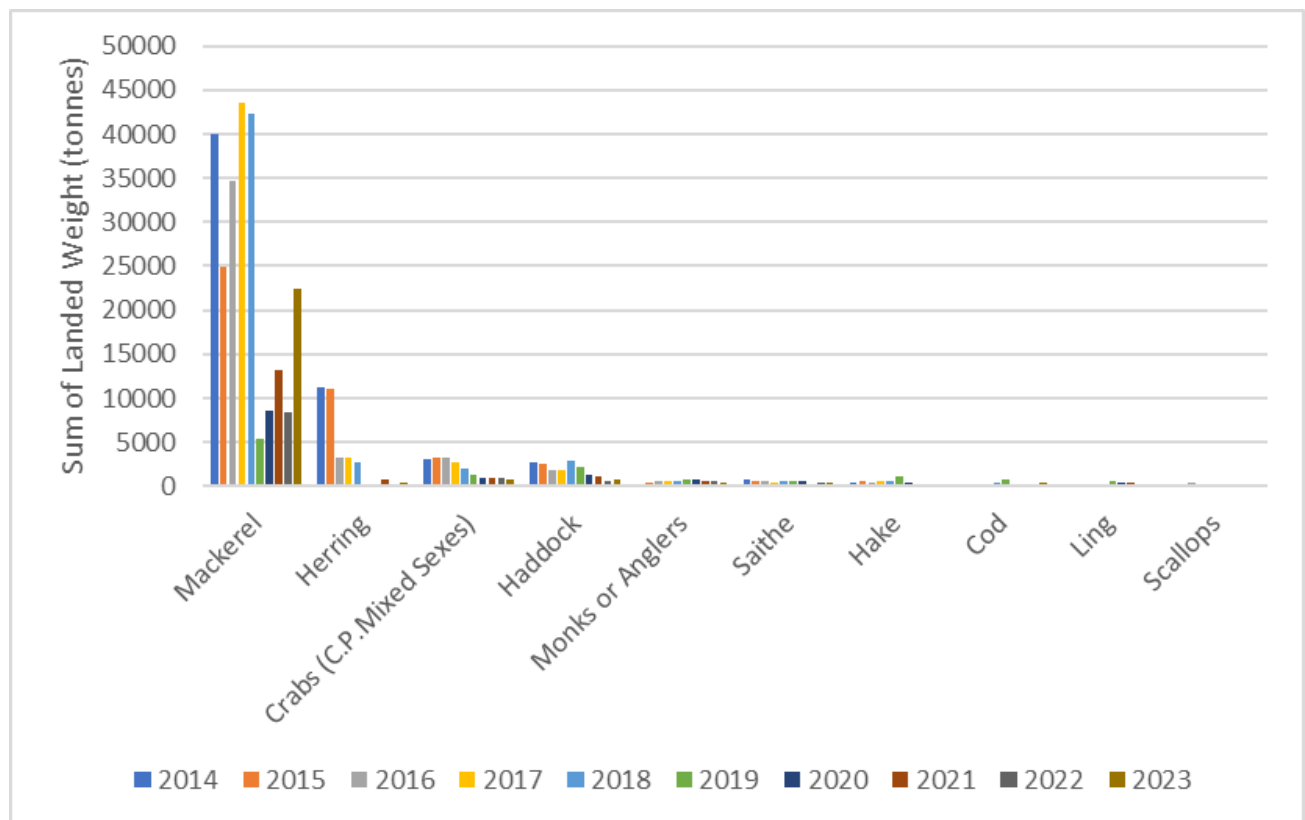



Figure 6.10-7 Top Ten Species Landed within the Commercial Fisheries Study Area during the Study Period by Weight (Tonnes)

A range of fishing methods are present within the Commercial Fisheries Study Area (MMO, 2024 & MMO, 2018b):

- Demersal trawl/seine
- Pelagic trawls
- Pots and traps
- Gears using hooks
- Longlines
- Dredge

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- Other passive gears
- Drift and fixed nets
- Other mobile gears
- Handlines

The top five fishing methods in terms of both landed weight (tonnes) and value (£) across the Commercial Fisheries Study Area are demersal trawl/seine, pelagic trawls, pots and traps, gears using hooks, and longlines, respectively, which are shown in Figure 6.10-8.

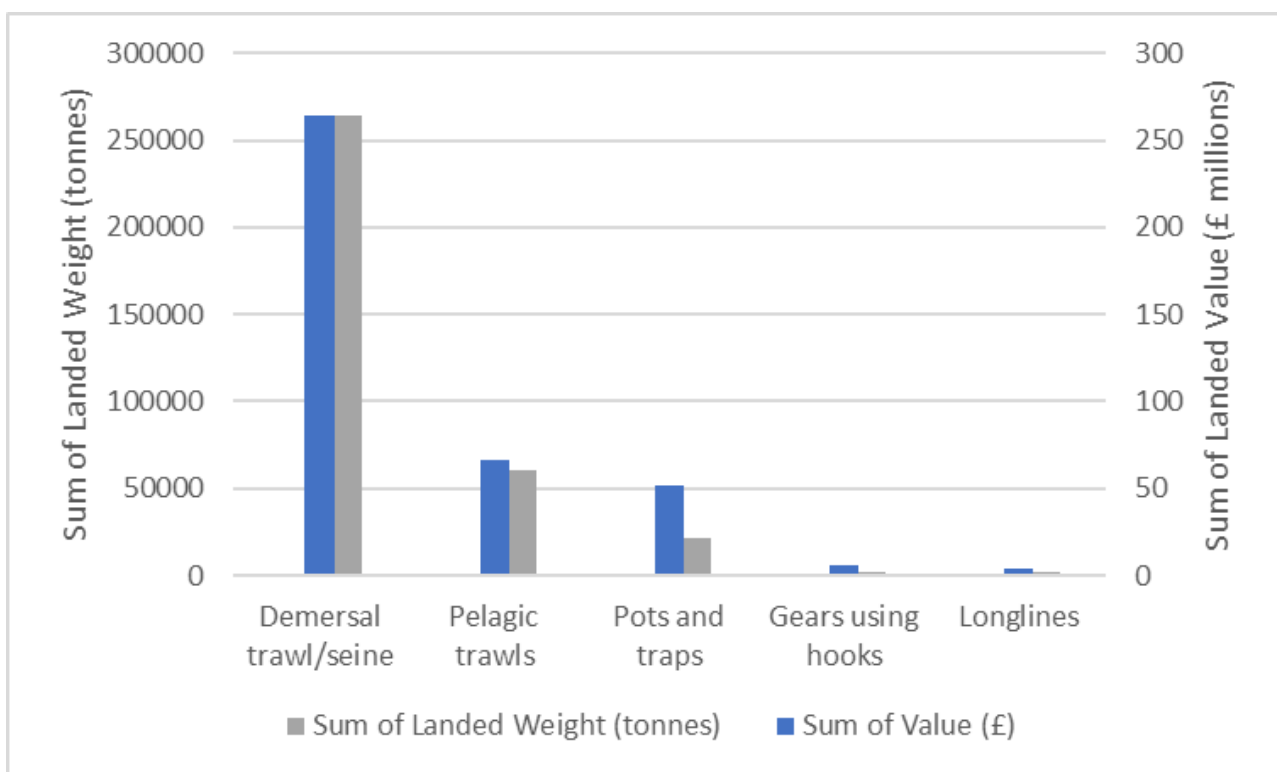


Figure 6.10-8 Top 5 Fishing Methods during the Study Period in Terms of Landed Weight (Tonnes) and Value (£) across the Commercial Fisheries Study Area

Array Area

The Array Area is situated in both ICES Rectangles 46E4 and 47E4 with the vast majority (over 99%) of the Array Area being situated within ICES Rectangle 46E4. The following section will consider the analysis of these two ICES Rectangles only.

Within ICES Rectangle 46E4 and 47E4, mobile gear, including demersal and pelagic trawls, are largely utilised, as per Figure 6.10-9, Table 6.10-4, Figure 6.10-10 and Table 6.10-5. Across the study period, demersal trawls/seine are responsible for the largest total landed weight and value out of all gear types

utilised within ICES 46E4 and 47E4, primarily targeting species such as haddock, monkfish or anglerfish, squid, cod, megrim, hake, whiting, plaice, turbot, lemon sole, ling and saithe (please note data limitation noted in Section 6.10.3.1). Pelagic trawls are responsible for the second-largest total landed value and weight out of all gear types utilised within ICES 46E4 and 47E4, primarily targeting species such as mackerel, horse mackerel and herring. Pots and traps were responsible for the third-largest total landed value and weight out of all gear types utilised within ICES 46E4 and 47E4, primarily targeting crabs, lobsters and ballan wrasse¹⁴.

Combined landed weight and value for ICES Rectangles 46E4 and 47E4 can be observed in Figure 6.10-9, Figure 6.10-10, Table 6.10-4 and Table 6.10-5. Individual landed weight and value for ICES Rectangles 46E4 can be observed in Figure 6.10-11, Figure 6.10-12, Table 6.10-6 and Table 6.10-7. Individual landed weight and value for ICES Rectangles 47E4 can be observed in Figure 6.10-13, Figure 6.10-14, Table 6.10-8 and Table 6.10-9.

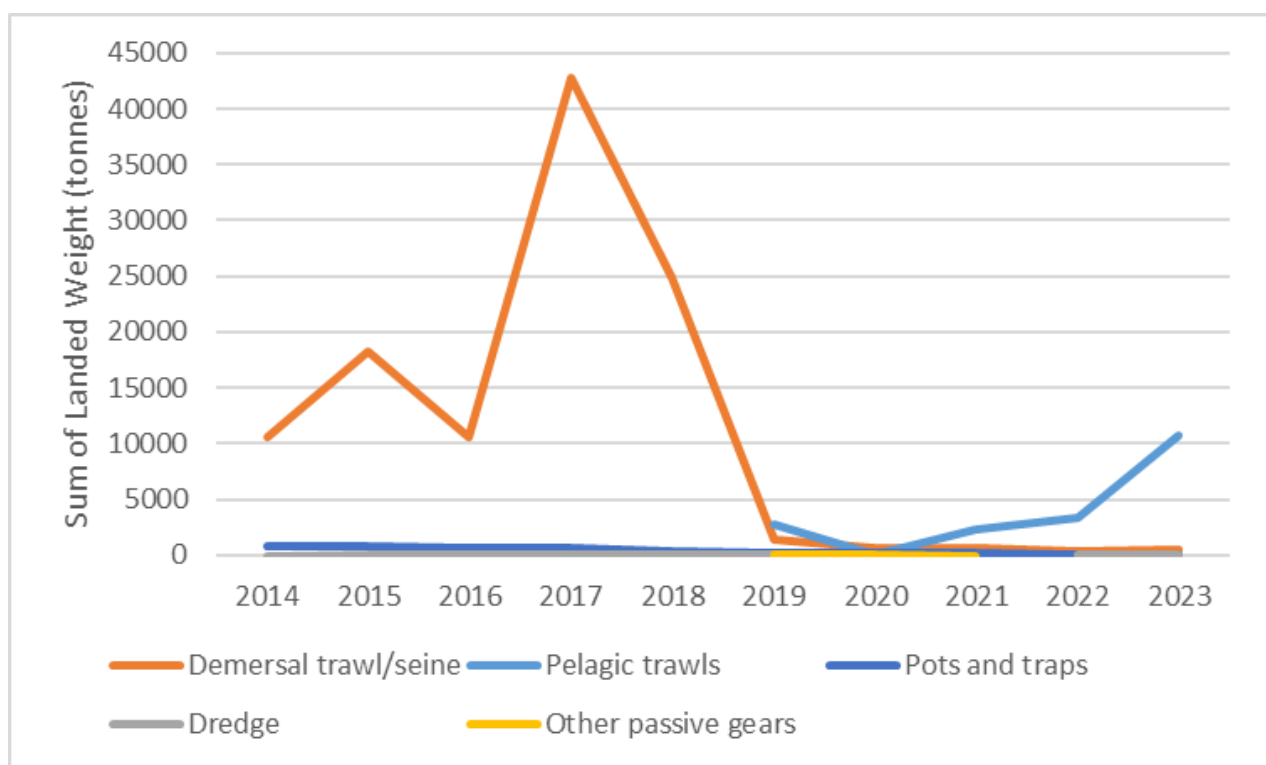


Figure 6.10-9 Landed Weight (Tonnes) from ICES Rectangle 46E4 and 47E4 during the Study Period by Gear Category

¹⁴ Zeros shown in the datasets are due to the mobile nature of the target species for certain gear types rather than a lack of data for certain years.


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Table 6.10-4 Landed Weight (Tonnes) from ICES Rectangle 46E4 and 47E4 during the Study Period by Gear Category

Gear Type	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total Value
Demersal trawl/seine	10,606	18,244	10,635	42,827	24,886	1,394	662	706	377	476	110,813
Pelagic trawls	0	0	0	0	0	2,724	5	2,335	3,313	10,754	19,132
Pots and traps	767	759	668	638	359	236	144	136	107	97	3,910
Dredge	1	6	13	2	10	3	1	0	6	4	46
Other passive gears	0	0	0	0	0	13	4	1	0	0	18

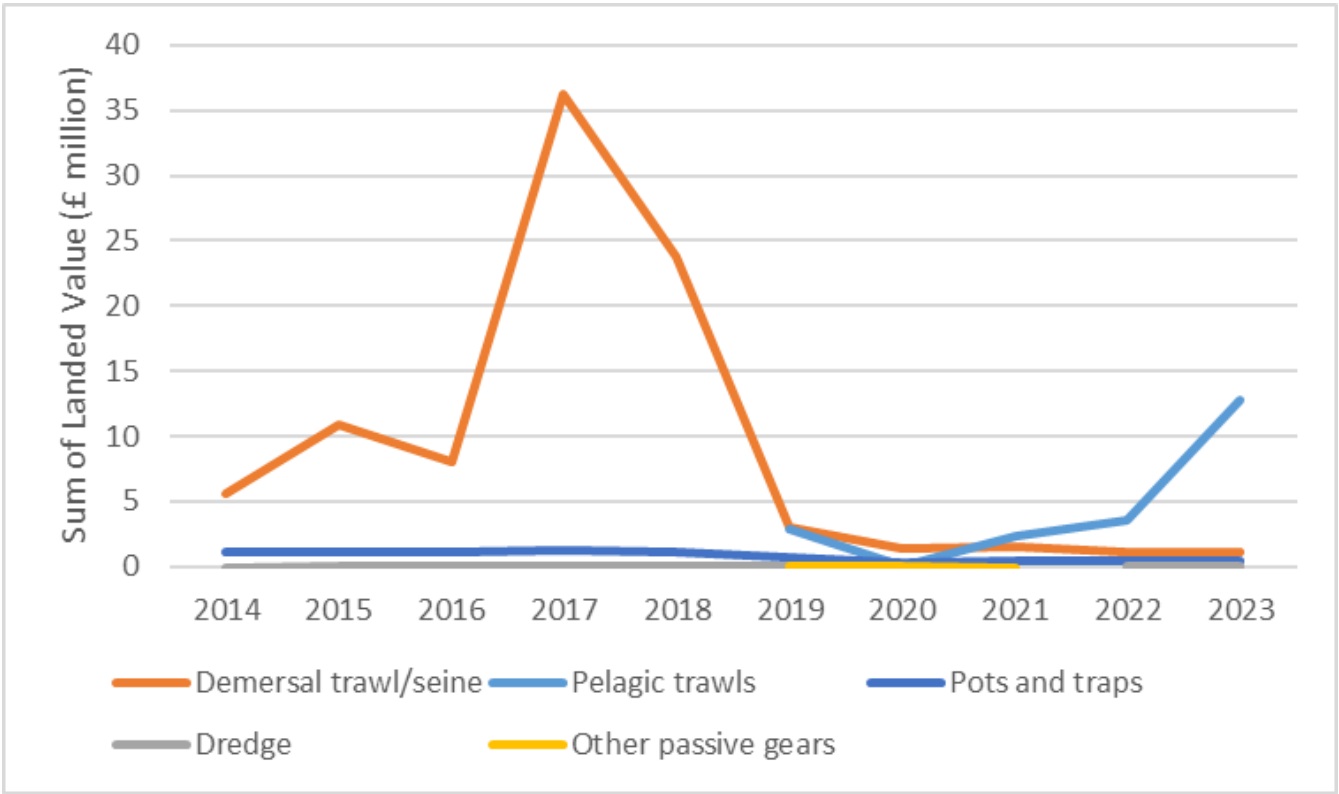


Figure 6.10-10 Values of Landings (£) from ICES Rectangle 46E4 and 47E4 during the Study Period by Gear Category


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Table 6.10-5 Values of Landings (£) from ICES Rectangle 46E4 and 47E4 during the Study Period by Gear Category

Gear Type	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total Value
Demersal trawl/seine	5,635,781	10,887,061	8,068,011	36,275,016	23,801,138	3,045,187	1,353,408	1,472,111	1,069,758	1,076,471	92,683,943
Pelagic trawls	0	0	0	0	0	2,873,239	13,866	2,327,911	3,587,107	12,753,753	21,555,876
Pots and traps	1,130,972	1,054,172	1,170,314	1,223,864	1,104,286	729,624	330,879	441,308	438,938	369,459	7,993,816
Dredge	1,912	11,731	26,727	4,006	26,377	6,773	2,490	0	11,945	9,107	101,068
Other passive gears	0	0	0	0	0	49,352	15,500	3,645	0	0	68,497

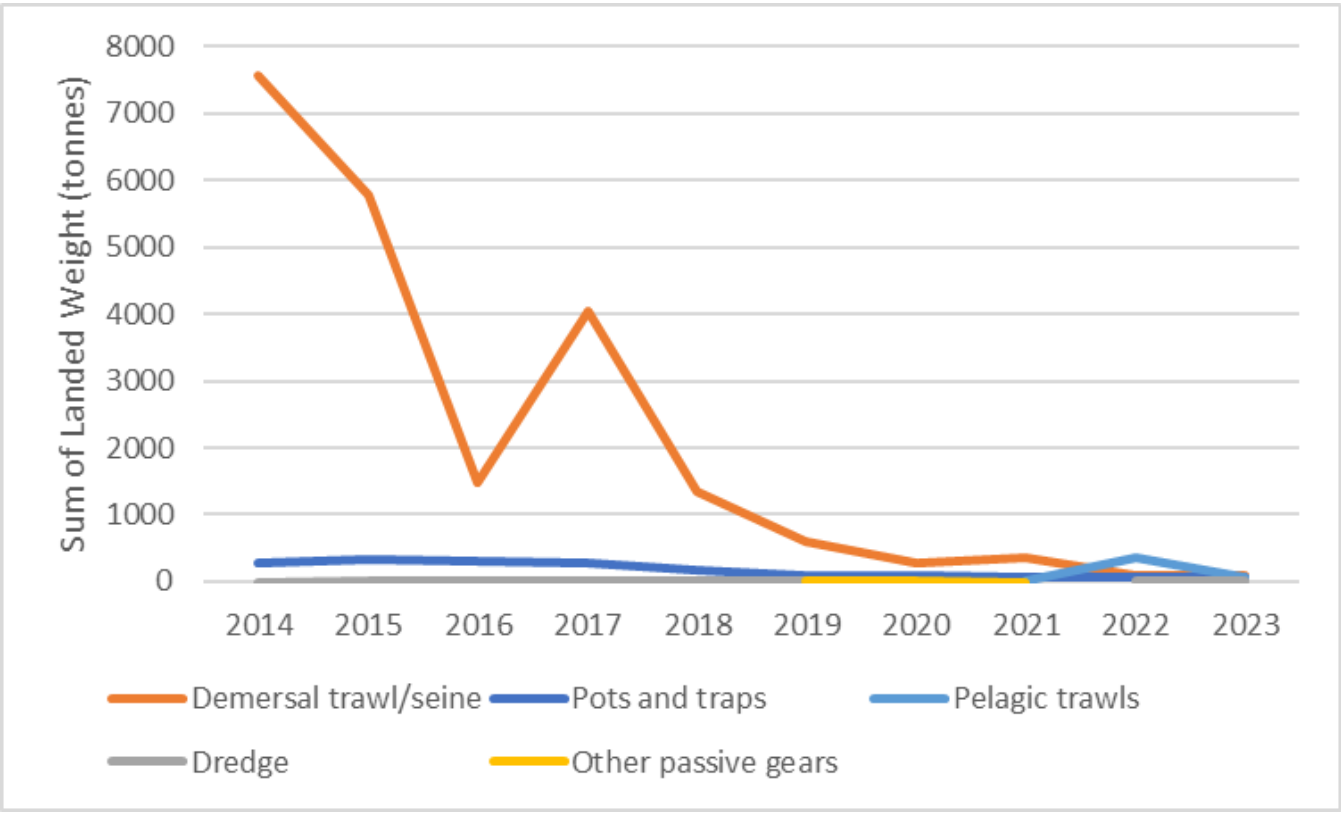


Figure 6.10-11 Landed Weight (Tonnes) from ICES Rectangle 46E4 during the Study Period by Gear Category

Table 6.10-6 Landed Weight (Tonnes) from ICES Rectangle 46E4 during the Study Period by Gear Category

Gear Type	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total Value
Demersal trawl/seine	7,560	5,776	1,485	4,037	1,349	597	283	352	102	103	21,642
Pots and traps	268	321	315	275	166	78	79	52	58	75	1,687
Pelagic trawls	0	0	0	0	0	682	0	4	366	55	1,106
Dredge	1	6	13	2	10	3	1	0	6	4	46
Other passive gears	0	0	0	0	0	13	4	1	0	0	18

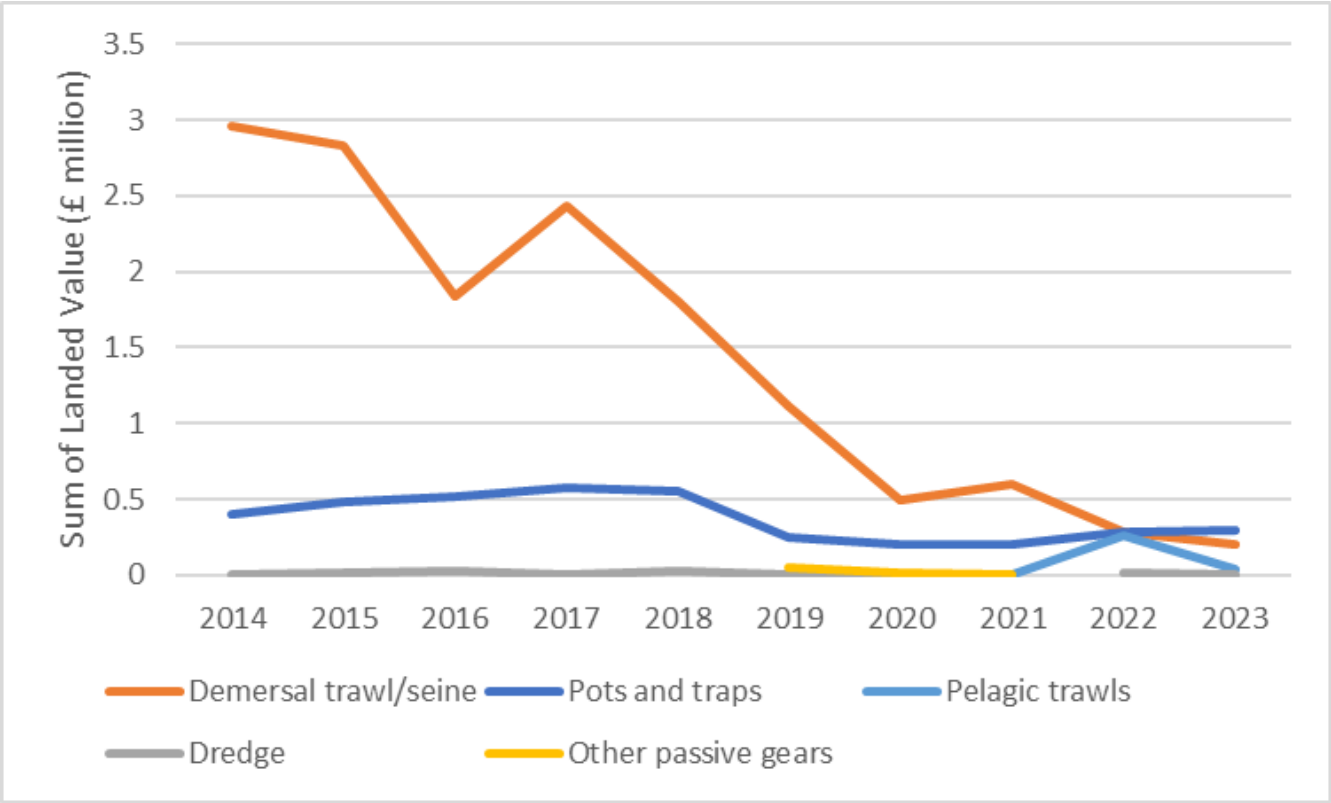


Figure 6.10-12 Values of Landings (£) from ICES Rectangle 46E4 during the Study Period by Gear Category


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Table 6.10-7 Values of Landings (£) from ICES Rectangle 46E4 during the Study Period by Gear Category

Gear Type	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total Value
Demersal trawl/seine	2,961,345	2,829,132	1,834,098	2,430,713	1,801,456	1,116,769	488,907	594,699	284,203	199,441	14,540,763
Pots and traps	400,714	480,209	520,808	574,455	549,388	250,858	196,830	205,141	284,645	292,395	3,755,444
Pelagic trawls	0	0	0	0	0	300,233	0	2,362	263,189	33,166	598,949
Dredge	1,912	11,731	26,727	4,006	26,377	6,773	2,490	0	11,945	9,107	101,068
Other passive gears	0	0	0	0	0	49,352	15,500	3,645	0	0	68,497

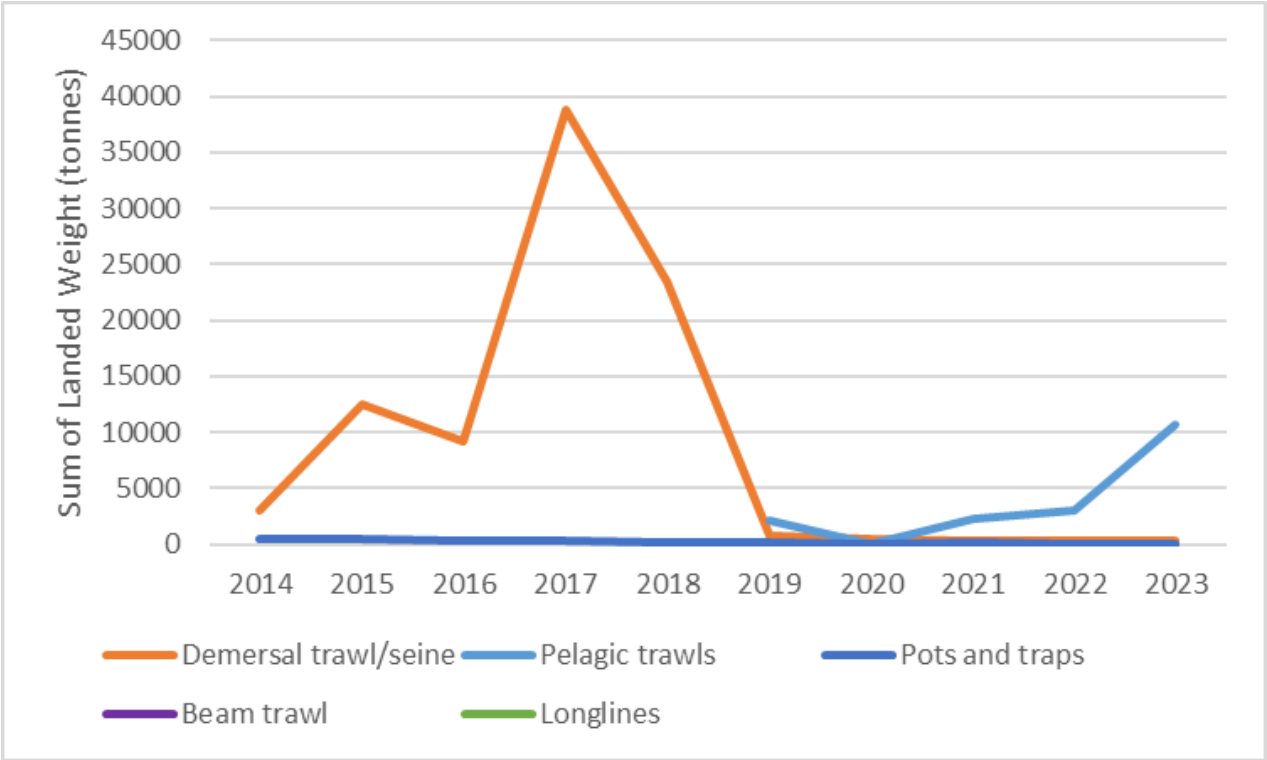


Figure 6.10-13 Landed Weight (Tonnes) from ICES Rectangle 47E4 during the Study Period by Gear Category

Table 6.10-8 Landed Weight (Tonnes) from ICES Rectangle 47E4 during the Study Period by Gear Category

Gear Type	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total Value
Demersal trawl/seine	3,047	12,469	9,151	38,790	23,537	797	379	354	276	373	89,171
Pelagic trawls	0	0	0	0	0	2,043	5	2,331	2,947	10,699	18,026
Pots and traps	499	438	353	363	193	158	64	83	49	22	2,223
Beam trawl	0	0	0	0	0	0	0	0	0	0	0
Longlines	0	0	0	0	0	0	0	0	0	0	0

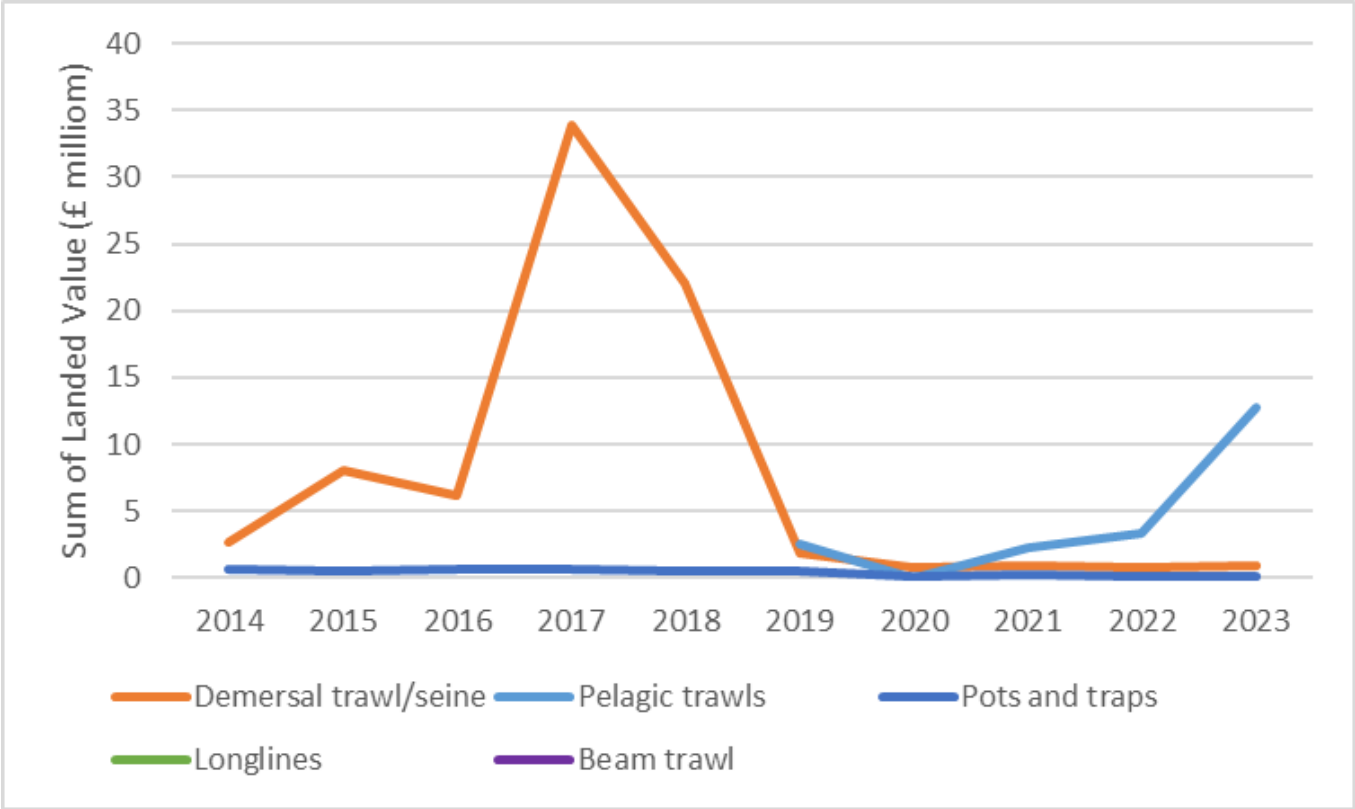


Figure 6.10-14 Values of Landings (£) from ICES Rectangle 47E4 during the Study Period by Gear Category



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Table 6.10-9 Values of Landings (£) from ICES Rectangle 47E4 during the Study Period by Gear Category

Gear Type	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total Value
Demersal trawl/seine	2,674,435	8,057,929	6,233,914	33,844,303	21,999,682	1,928,418	864,501	877,412	785,555	877,030	78,143,180
Pelagic trawls	0	0	0	0	0	2,573,006	13,866	2,325,549	3,323,918	12,720,588	20,956,927
Pots and traps	730,257	573,964	649,506	649,409	554,897	478,766	134,048	236,167	154,293	77,064	423,8372
Longlines	0	0	0	0	0	152	0	0	0	0	152
Beam trawl	0	0	0	0	0	0	0	0	27	0	27

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Between 2014 to 2023 within ICES Rectangle 46E4 and 47E4, the top ten commercial species in terms of landed weights (Figure 6.10-15) were identified as:

- Mackerel (*Scomber scombrus*) (105,401 tonnes)
- Herring (*Clupea harengus*) (15,819 tonnes)
- Haddock (*Melanogrammus aeglefinus*) (4,763 tonnes)
- Crabs (*Cancer pagurus* (C.P.) mixed sexes) (3,845 tonnes)
- Monkfish or Anglerfish (*Lophius*) (606 tonnes)
- Horse mackerel (*Trachurus trachurus*) (479 tonnes)
- Saithe (*Pollachius virens*) (462 tonnes)
- Megrim (*Lepidorhombus whiffiagonis*) (406 tonnes)
- Cod (*Gadus morhua*) (403 tonnes)
- Whiting (*Merlangius merlangus*) (270 tonnes)

The landed weight for the top ten species excluding mackerel can be observed in Figure 6.10-16. This figure is presented so that the landing weights for other species can be observed (i.e. the high mackerel landings distort the scale).

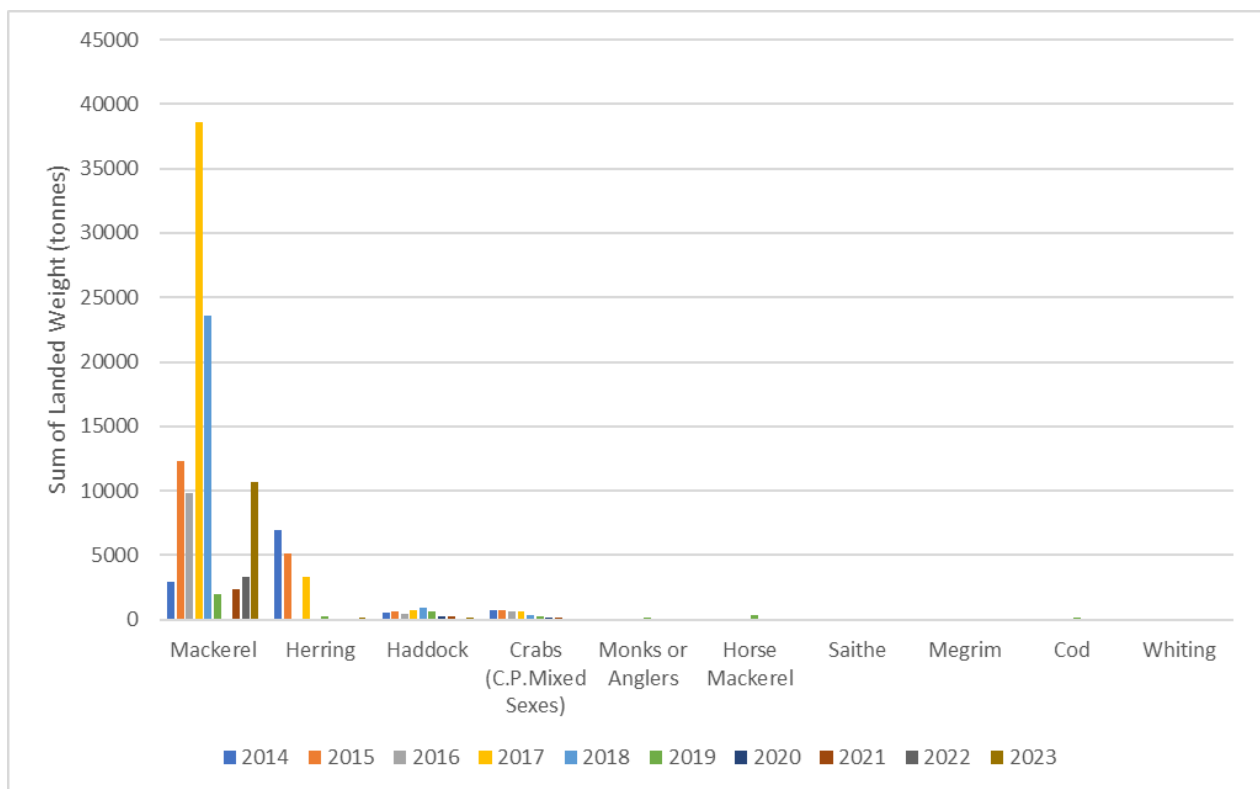



Figure 6.10-15 Top Ten Species Landed within ICES Rectangles 46E4 and 47E4 during the Study Period by Weight (Tonnes)

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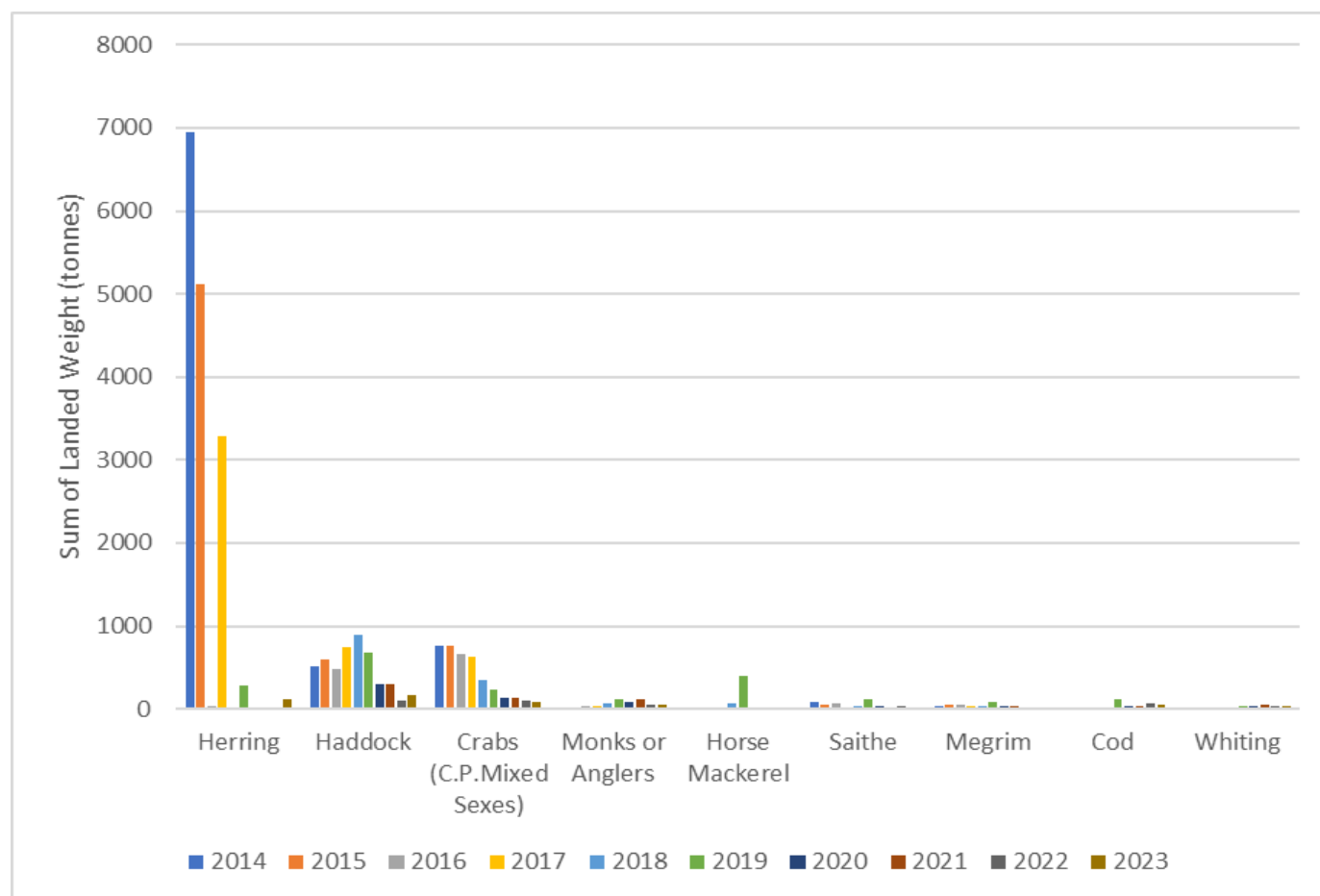


Figure 6.10-16 Top Ten Species Landed within ICES Rectangles 46E4 and 47E4 during the Study Period by Weight (Tonnes) excluding Mackerel

Offshore Cable Corridor Area of Search

The Offshore Cable Corridor Area of Search is situated in ICES Rectangles 46E5 and 46E6. The following section will consider the analysis of these two ICES Rectangles only.

Within ICES Rectangles 46E5 and 46E6, mobile gear, predominately demersal trawls/seine and to a lesser extent pelagic trawls are utilised, as well as static gear including pots and traps, as per Figure 6.10-17, Table 6.10-10, Figure 6.10-18 and Table 6.10-11. Across all years (2014-2023), demersal trawls/seine were responsible for the largest total landed weight and second largest total value out of all gear types utilised within ICES 46E5 and 46E6 (please note data limitation noted in Section 6.10.3.1). Demersal trawls/seine primarily target species such as haddock, monkfish or anglerfish, squid, cod, megrim, hake, whiting, plaice, turbot, lemon sole, ling and saithe. Pots and traps were responsible for the second-largest total landed weight and largest total landed value out of all gear types utilised within ICES 46E5 and 46E6, primarily targeting species such as crabs, lobsters and ballan wrasse. Pelagic trawls were responsible for the fifth-largest total landed value and third-largest weight out of all gear types utilised within ICES 46E5 and 46E6,

primarily targeting species such as mackerel, horse mackerel and herring. Combined landed weight and value for ICES Rectangles 46E5 and 46E6 can be observed in Figure 6.10-17, Figure 6.10-18, Table 6.10-10 and Table 6.10-11¹⁵.

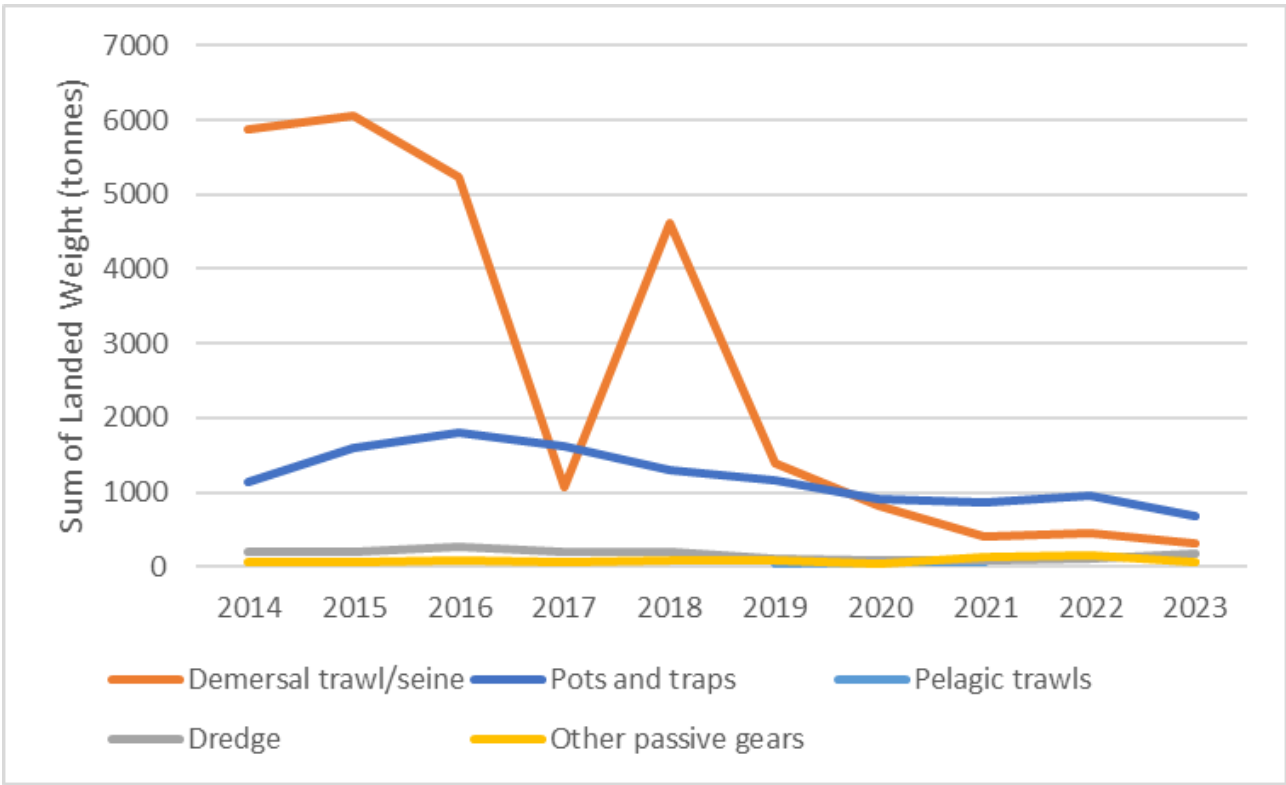


Figure 6.10-17 Landed Weight (Tonnes) from ICES Rectangle 46E5 and 46E6 during the Study Period by Gear Category

¹⁵ Zeros shown in the datasets are due to the mobile nature of the target species for certain gear types rather than a lack of data for certain years.


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Table 6.10-10 Landed Weight (Tonnes) from ICES Rectangle 46E5 and 46E6 during the Study Period by Gear Category

Gear Type	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total Value
Demersal trawl/seine	5,879	6,069	5,238	1,071	4,613	1,389	826	400	455	328	26,268
Pots and traps	1,138	1,602	1,811	1,617	1,296	1,156	918	875	967	689	12,068
Pelagic trawls	0	0	0	0	0	38	64	67	0	1,761	1,929
Dredge	197	201	274	208	206	116	94	93	107	170	1,667
Other passive gears	59	65	77	67	96	81	47	126	147	66	831

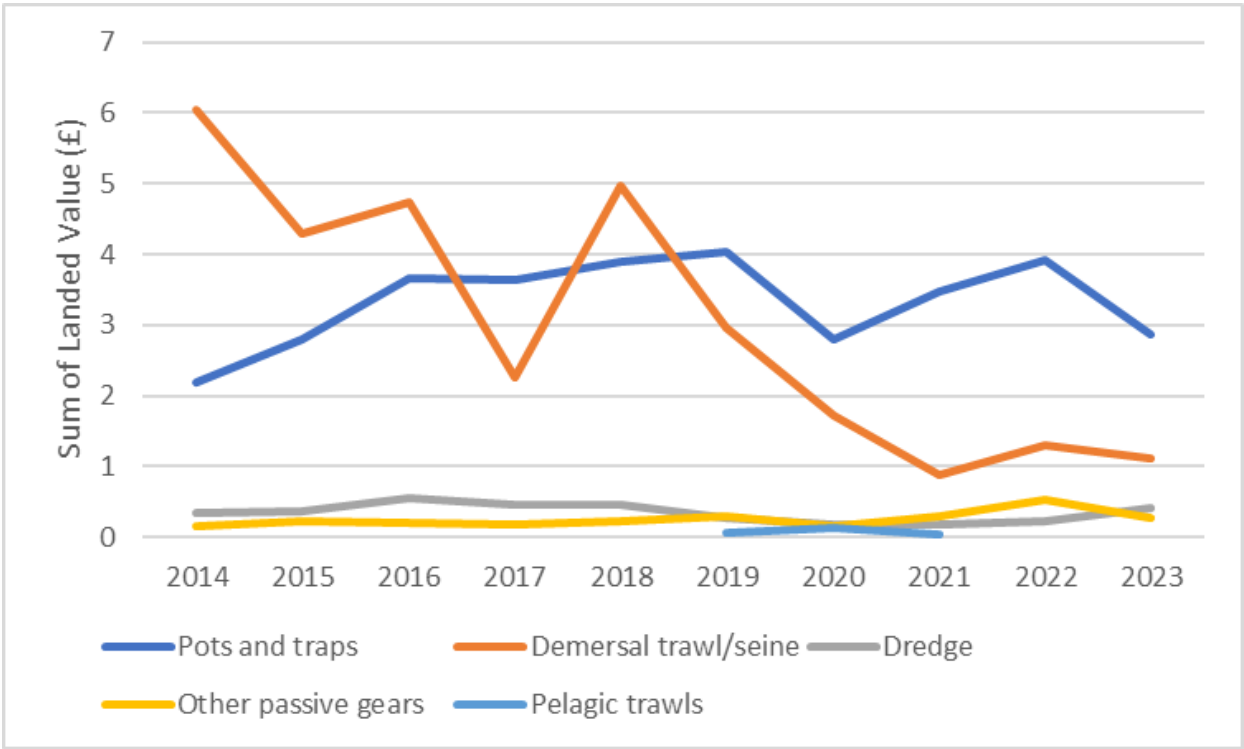


Figure 6.10-18 Landed Value (£) from ICES Rectangles 46E5 and 46E6 during the Study Period by Gear Category



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Table 6.10-11 Landed Value (£) from ICES Rectangles 46E5 and 46E6 during the Study Period by Gear Category

Gear Type	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total Value
Pots and traps	2,185,807	2,799,716	3,672,068	3,633,304	3,891,919	4,040,657	2,802,756	3,469,871	3,920,626	2,871,698	33,288,422
Demersal trawl/seine	6,051,716	4,288,382	4,730,194	2,267,133	4,965,995	2,964,531	1,732,654	877,435	1,299,256	1,105,332	30,282,628
Dredge	345,528	360,879	563,529	454,806	459,925	270,493	183,734	179,404	232,733	420,082	3,471,112
Other passive gears	159,873	229,595	212,164	188,713	218,684	289,359	151,179	288,740	524,031	270,403	2,532,741
Pelagic trawls	0	0	0	0	0	60,865	140,916	42,200	0	2,147,025	2,391,006

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Between 2013 to 2023 within ICES Rectangle 46E5 and 46E6, the top ten commercial species in terms of landed weights (Figure 6.10-19 and Table 6.10-12) were identified as:

- Herring (*C. harengus*) (11,884 tonnes)
- Crabs (*C. pagurus* (C.P.) mixed sexes) (9,646 tonnes)
- Mackerel (*S. scombrus*) (5,790 tonnes)
- Haddock (*M. aeglefinus*) (5,762 tonnes)
- Scallops (*Pectinidae*) (2,488 tonnes)
- Cod (*G. morhua*) (1,465 tonnes)
- Monkfish or Anglerfish (*Lophius*) (920 tonnes)
- Velvet crabs (*Necora puber*) (817 tonnes)
- Whelks (*Buccinum undatum*) (700 tonnes)
- Whiting (*M. merlangus*) (694 tonnes)

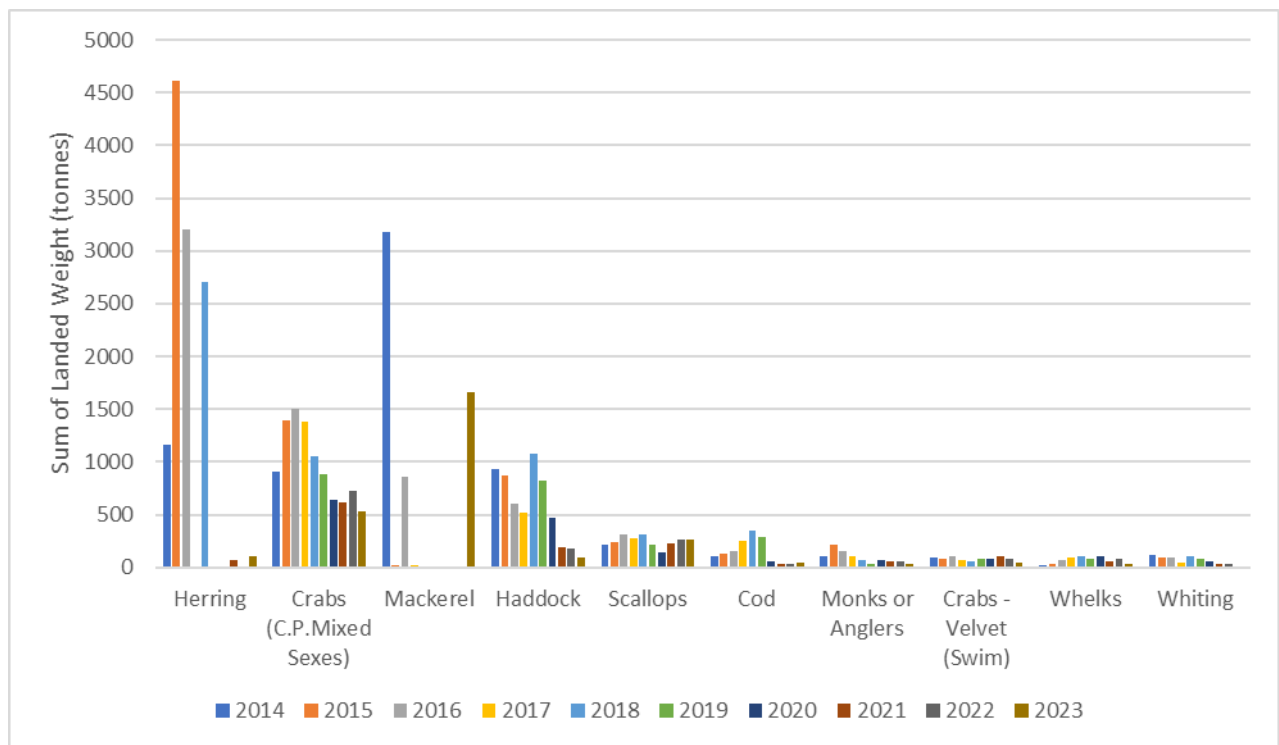


Figure 6.10-19 Top Ten Species Landed within ICES Rectangles 46E5 and 46E6 during the Study Period by Weight (Tonnes)



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Table 6.10-12 Top Ten Species Landed within ICES Rectangles 46E5 and 46E6 during the Study Period by Weight (Tonnes)

Species Name	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total Value
Herring	1,160	4,617	3,209	0	2,710	12	0	67	0	110	11,884
Crabs (C.P.Mixed Sexes)	911	1,396	1,509	1,377	1,056	889	642	614	723	529	9,646
Mackerel	3,173	24	865	22	15	9	7	7	11	1,658	5,790
Haddock	932	868	610	514	1,073	825	475	190	180	95	5,762
Scallops	219	241	310	283	309	217	148	232	263	265	2,488
Cod	103	137	154	259	352	287	60	31	31	52	1,465
Monks or Anglers	104	213	158	106	72	35	70	58	64	40	920
Crabs - Velvet (Swim)	98	81	104	68	59	89	82	108	80	48	817
Whelks	26	33	72	95	107	78	112	64	84	30	700
Whiting	121	100	90	43	108	85	64	36	36	12	694


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6.10.4. DESIGNED IN MITIGATION

The designed in mitigation relevant to the Commercial Fisheries assessment, which have been incorporated into the current design of the Offshore Project, is outlined below in Table 6.10-13. If required as part of the assessment, further mitigation measures may be proposed as part of the Offshore EIAR.

Table 6.10-13 Commercial Fisheries Designed In Mitigation Measures

ID	Designed In Mitigation Measure	How the measure will be secured
ID017	Consultation via implementation of an Offshore Fisheries Liaison Officer (OFLO), Company Fisheries Liaison Officer (CFLO) and Fishing Industry Representative (FIR) (if appropriate) to mitigate data gaps, consultation with local, regional and national fishing organisations, as well as individual fishers as required for the Array Area.	Secured under Section 36 and/or Marine Licence consent conditions.
ID018	Standard industry practice and protocols will be adhered to, including application for safety zones during construction, major maintenance activities and decommissioning, and implementation of advisory clearance distances from vessels working on the Offshore Project.	As per Section 95 and Schedule 16 of the Energy Act 2004.
ID019	Development and adherence to a Fisheries Mitigation Monitoring and Communication Plan (FMMCP).	FMMCP submitted with the Offshore EIAR. Measures secured under Section 36 and/or Marine Licence consent conditions.
ID020	Appointment of a CFLO and FIR (if appropriate) as the primary points of contact for the fishing industry when direct communication with the developer is required to maintain effective communications between the commercial fishing industry and the developer.	The requirement and appointment of an FIR will be agreed with key stakeholders during consultation.
ID038	Timely promulgation of information via Notices to Mariners (NtM), Notice to Fishermen (NtF) and marking on nautical charts. Consultation with relevant stakeholders to raise awareness of the Offshore Project.	Secured under Section 36 and/or Marine Licence consent conditions.

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6.10.5. SUMMARY OF KEY RECEPTORS, SENSITIVITIES AND LIKELY SIGNIFICANT EFFECTS

Based on the vessel and associated gear types identified within the Commercial Fisheries Study Area, the key receptors for Commercial Fisheries are:

- Inshore static vessels
- Offshore static vessels
- Local demersal vessels
- Nomadic demersal vessels
- Pelagic vessels

6.10.5.1.Likely Significant Effects

The scoping of likely significant effects on Commercial Fisheries receptors which may arise within the Commercial Fisheries Study Area via the proposed Offshore Project, is outlined in Table 6.10-14.




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Table 6.10-14 EIA Scoping Assessment for Commercial Fisheries


Potential Impact	Scoping Result	Justification	Assessment Method
Construction and Decommissioning			
Temporary or restricted access to, traditional fishing grounds	In	Safety zones and advisory clearance distances will need to be implemented to comply with health and safety requirements, which can lead to loss or restricted access to fishing grounds. Consideration of increased or varying weather events and implications for adverse weather routing for commercial fisheries vessels will be taken into account.	A desk-based review will be conducted using up to date Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) guidance and the FMMCP.
Displacement of fishing vessels into other areas	In	Safety zones and advisory clearance distances will need to be implemented to comply with health and safety requirements, potentially displacing fishers into other areas.	A desk-based review will be conducted using up to date FLOWW guidance and the FMMCP.
Increased steaming times to fishing grounds	In	Safety zones and advisory clearance distances will need to be implemented to comply with health and safety requirements, potentially altering routes to preferred fishing grounds.	A desk-based review of Automatic Identification System (AIS) and Shipping and Navigation site-specific surveys will be conducted, alongside further stakeholder engagement.
Increased project related vessel traffic within fishing grounds and safe harbour areas	In	Increased traffic from Offshore Project associated vessels may lead to a loss and restricted access to fishing grounds, live fish storage areas, as well as mooring or anchoring areas for the fishing fleet.	A desk-based review of AIS and Shipping and Navigation site-specific surveys will be conducted, alongside further stakeholder engagement.

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Potential Impact	Scoping Result	Justification	Assessment Method
Obstacles on the seabed and in the water column during the construction and decommissioning phase of the Offshore Project.	In	Presence of infrastructure with the potential of snagging during fishing activities may impact the gear type used and change the primary target species.	A desk-based review of the Offshore PDE and the Other Marine Users chapter (Chapter 6.13) will be conducted. A review of survey and construction activities will also be undertaken alongside further stakeholder engagement and consideration of ICES data.
Displacement or disruption of fishing activity arising from disturbance of commercially important fish and shellfish species during the construction and decommissioning phase of the Offshore Project.	In	Construction and decommissioning of the Offshore Project may lead to disturbance of commercially important fish and shellfish species.	A desk-based assessment will be conducted and informed by the outcomes of the fish and shellfish impact assessment. It will be assumed that any impact to commercial fisheries will arise as a result of any loss of resources.
Operation and Maintenance			
Temporary or complete loss, or restricted access to, traditional fishing grounds	In	Presence of infrastructure, as well as safety zones and advisory clearance distances during maintenance activities can lead to loss or restricted access to fishing grounds. Consideration of increased or varying weather events and implications for adverse weather routing for commercial fisheries vessels will be taken into account.	A desk-based review of literature will be conducted, alongside further stakeholder engagement.

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Potential Impact	Scoping Result	Justification	Assessment Method
Displacement of fishing vessels into other areas	In	Presence of infrastructure, as well as safety zones and advisory clearance distances during maintenance can potentially displace fishers into other areas.	A desk-based review of literature will be conducted, alongside further stakeholder engagement including a commercial fisheries questionnaire.
Increased steaming times to fishing grounds	In	Presence of infrastructure, as well as safety zones and advisory clearance distances during maintenance can potentially alter routes to preferred fishing grounds.	A desk-based review of AIS and Shipping and Navigation site-specific surveys will be conducted, alongside further stakeholder engagement.
Increased project related vessel traffic within fishing grounds and safe harbour areas	In	Increased traffic from project associated vessels may lead to a loss and restricted access to fishing grounds, live fish storage areas, as well as mooring or anchoring areas for the fishing fleet.	A desk-based review of AIS and Shipping and Navigation site-specific surveys will be conducted, alongside further stakeholder engagement.
Obstacles on the seabed and in the water column during the operational phase of the Offshore Project.	In	Presence of infrastructure with the potential of snagging during fishing activities may impact the gear type used and change the primary target species within the Offshore Project area once operational. Long term scientific pelagic surveys that gather evidence for quota advice may also be affected by this infrastructure.	A desk-based review of the PDE and the Other Marine Users chapter (Chapter 6.13) will be conducted. A review of survey and operations and maintenance activities will also be undertaken alongside further stakeholder engagement and consideration of ICES data.
Displacements or disruption of fishing activity arising	In	Operation and maintenance of the Offshore Project may lead to disturbance of	A desk-based assessment will be conducted and informed by the outcomes of the fish and shellfish

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Potential Impact	Scoping Result	Justification	Assessment Method
from disturbance of commercially important fish and shellfish species during the operation and maintenance phase of the Offshore Project.		commercially important fish and shellfish species.	impact assessment. It will be assumed that any impact to commercial fisheries will arise as a result of any loss of resources.

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6.10.6. PROPOSED APPROACH TO EIA

6.10.6.1. Relevant Data Sources

Data sources listed within Table 6.10-1, alongside further secondary data sources including published and unpublished papers, journals and reports will be used to inform the EIA. These sources may be further supplemented by any additional material identified during stakeholder consultation.

Consultation with the organisations listed in Section 6.10.6.2 below will be used to identify additional data sets or baseline data, such as non-UK fleet data sets, industry plotter data and inshore vessel data (i.e. vessels without VMS). In addition, data from the FiSMaDiM (Fisheries Sensitivity Mapping and Displacement Modelling), which completed in August 2024, and was last updated in February 2025, will be considered in the Offshore EIAR¹⁶. The FiSMaDiM aimed to map areas of high importance for the fishing industry, and the economic impact that potential OWF development will have on fishing activity.

6.10.6.2. Consultation


The Offshore Project is fully committed to working in partnership and engaging with all stakeholders throughout the development, construction, and operation of the Offshore Project. This Offshore Scoping Report, and the associated Scoping Workshops, constitute the initial engagement of the Offshore Project with the commercial fishing industry. As the Offshore Project progresses, stakeholder engagement will continue and build upon the initial engagement and scoping engagement activities, including at key points such as prior to and during survey activities and throughout the EIA process. Feedback received during the Scoping Workshop has been incorporated into this chapter, where possible. Where this has not been possible, or where additional feedback was received after the drafting of this chapter, it will be considered by the Offshore Project as part of the ongoing consultation and will be incorporated (where applicable) into the Offshore EIAR.

Organisations that will be consulted with respect to this specific EIA topic, include (but not limited to):

- MD-LOT
- NatureScot
- The Highland Council
- The Outer Hebrides RIFG
- The North West Coast RIFG

¹⁶ FiSMaDiM Public Web App is available via:

<https://gisserver.cefas.co.uk/portal/apps/webappviewer/index.html?id=0055ba8982bf4325bcd8f64ce93eb797>

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- The North East Coast RIFG
- Orkney RIFG
- Orkney Fisheries Association
- MNWFA
- Local Fishing Skippers
- SFO
- SPFA Ltd
- SFF
- SWFPA Ltd
- SSA
- Scottish Creel Fishermen’s Federation
- North and West District Salmon Fisheries Board
- Northern District Salmon Fishery Board
- Scrabster Harbour Trust
- CIFA
- Shetland Fishermen’s Association (SFA)

6.10.6.3. Policy, Legislation and Guidance

The assessment of Commercial Fisheries will consider the legislation, policy and guidance listed below (Table 6.10-15). Additional guidance may be applied, if available at the time of the Offshore EIAR, as identified through consultation with relevant stakeholders.

Table 6.10-15 Legislation, Policy and Guidance Relevant to the Commercial Fisheries Assessment.

Relevant Legislation, Policy and Guidance
Legislation and Policy
Marine Scotland Act, 2010
Marine and Coastal Access Act, 2009
Environmental Assessment (Scotland) Act, 2009
Scotland’s National Marine Plan, 2015
Sectoral Marine Plan (North)
Blue Economy Vision
Habitats Regulations (Annex I features)
Marine Strategy Framework Directive and Good Environmental Status
Guidance

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Relevant Legislation, Policy and Guidance
FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison (FLOWW, 2014)
Good Practice Guidance for assessing fisheries displacement by other licensed marine activities (Marine Directorate, 2022)
Fishing and Submarine Cables (International Cable Protection Committee, 2009)
Marine licensing and consenting: offshore renewable energy projects: Fisheries Mitigation, Monitoring and Communication Plan (Marine Directorate, 2025)


6.10.6.4. Assessment Methodology

The assessment will follow the methodology described in Chapter 4: Proposed Approach to EIA. The Offshore EIAR will assess the level of significance of effect expected to result from the Offshore Project, for those potential impacts scoped into the Offshore EIAR, utilising best practice EIA methodology. The assessment will be based on both the potential magnitude of change caused by an impact ('impact magnitude') arising from the Offshore Project and the sensitivity of relevant receptors; designed in mitigation measures will then also be considered alongside these components. Criteria for magnitude of effect and sensitivity of relevant receptors will be developed during the EIA process following further assessment of the baseline conditions and stakeholder engagement. The assessment of the likely significant effects of the Offshore Project will be undertaken through application of the evidence base.

Cumulative and transboundary effects are also discussed in Chapter 4: Proposed Approach to EIA, and assessment of these will apply to commercial fisheries.

With respect to the identification of key receptor groups, this will be done via consultation with key Commercial Fisheries stakeholders, as described above, to ensure the most appropriate receptor groups are assessed. As an example, for previous projects, the following receptor groups have been used within the assessment process: inshore (<10 m) static gear vessels; offshore (>12 m) static gear vessels; local demersal vessels; nomadic demersal vessels; and pelagic vessels. This approach ensures that the likely significant effects of the Offshore Project, which may differ for different fishing vessel types/sizes, is robustly assessed.

Stakeholder consultation will be ongoing throughout the project lifetime and will also be undertaken at pivotal points throughout the EIA process to ensure that the approach, including the application of the evidence base, satisfies the requirements of both stakeholders and regulators. Examples of pivotal points include post receipt of scoping opinion, prior to commencement of, and at the draft production of the chapter during the Offshore EIAR.

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6.10.7. SCOPING QUESTIONS FOR CONSULTTEES

Scoping questions for consultees in relation to the Commercial Fisheries assessment include:

1. Do you agree that the data sources referenced above to inform the baseline are valid for the purposes of this scoping assessment?
2. Have all commercial fisheries receptors and potential impacts that could result from the Offshore Project been identified? Are there any other receptors that should be included within the assessment?
3. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts for commercial fisheries?
4. Do you agree with the assessment methodology proposed to be undertaken within the Offshore EIAR?
5. Do you agree that the designed in mitigation measures described provide a suitable means for managing and mitigating the relevant potential effects of the Offshore Project on commercial fisheries receptors?
6. Are there any other stakeholders that should be consulted?

6.10.8. REFERENCES

Dounreay FEPA closure, Food Protection (Emergency Prohibitions) (Dounreay Nuclear Establishment) Order 1997.


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MMO, 2018b. 2014 to 2018 UK fleet landings by ICES rectangle. Available at: <https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2018> [Accessed March 2025].

MMO, 2024. UK sea fisheries annual statistics report 2023. Available online at: <https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2022> [Accessed September 2024].

Regional Inshore Fisheries Group network regional chart, Scottish Government (2023) data licenced under open government licence.

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6.11. SHIPPING AND NAVIGATION

6.11.1. INTRODUCTION

This chapter of the Offshore Scoping Report provides an overview of the baseline environment for Shipping and Navigation within the Array Area and Offshore Cable Corridor Area of Search. It also includes a scoping assessment of likely significant effects for the relevant receptors, from the construction, operation (including maintenance), and decommissioning phases of the Offshore Project.

6.11.2. STUDY AREA

The Shipping and Navigation Study Area was defined to capture all relevant features and vessel routeing that may be impacted, all while remaining site specific to the Offshore Project. The scoping design envelope extends to MHWS. It should be noted that the topic-specific study area will vary depending on the nature and scale of each receptor, or associated pathway, that could result in a receptor effect.

As is shown in Figure 6.11-1, the Shipping and Navigation Study Area comprises of a 10 nm (18.5 km) buffer around the Array Area combined with a 3 nm (5.6 km) buffer around the Offshore Cable Corridor Area of Search. The Array Area is located approximately 15 nm (27.8 km) northwest of Cape Wrath and 20 nm (37.0 km) northeast of the Butt of Lewis. The coastal perimeter of the Shipping and Navigation Study Area extends east to west from 1.5 nm (2.8 km) east of Dunnet Head to Cape Wrath.

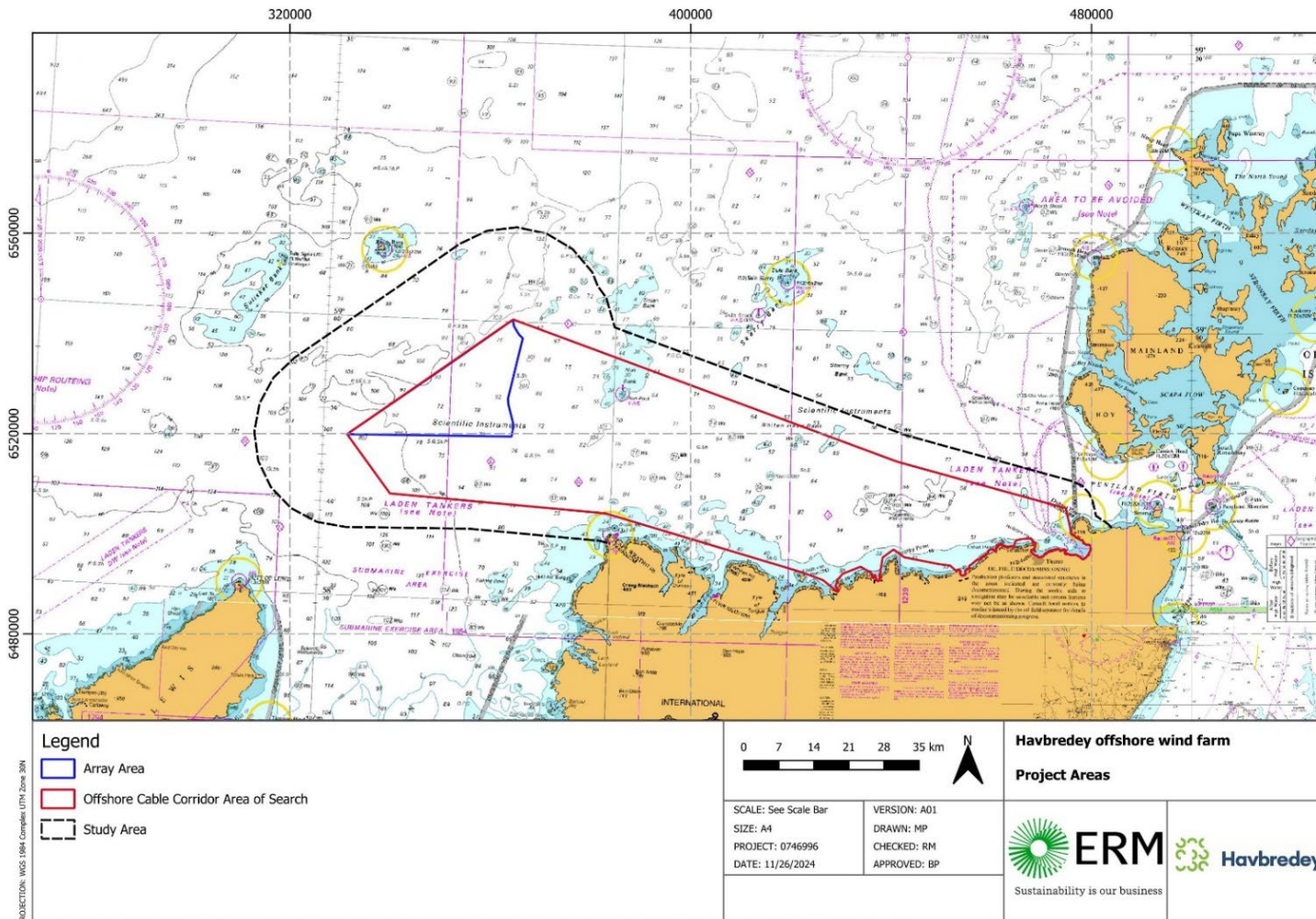



Figure 6.11-1 Shipping and Navigation Study Area

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6.11.3. BASELINE ENVIRONMENT

6.11.3.1. Data Sources


Data sources used to inform this Shipping and Navigation Chapter of the Offshore Scoping Report are presented in Table 6.11-1.

Table 6.11-1 Summary of Key Data Sources for Shipping and Navigation

Source	Spatial Coverage	Year	Summary
EMODnet vessel traffic density	Shipping and Navigation Study Area	2023	Vessel traffic density recorded in 2023 within Europe
The RYA UK Coastal Atlas	Shipping and Navigation Study Area	2019	Intensity of recreational boating activity around the UK
United Kingdom Hydrographic Office (UKHO) Admiralty charts	Shipping and Navigation Study Area	2024	Nautical charts used for marine navigation. Includes location of pilot boarding areas, wrecks, International Maritime Organization (IMO) routeing measures, anchorage areas, harbour areas, military practice areas and subsea cables and pipelines
UKHO Admiralty Sailing Directions - NP66B (UKHO)	Shipping and Navigation Study Area	2023	Sailing directions publication used for marine navigation
CES OWF boundaries	Shipping and Navigation Study Area	2024	Existing and proposed OWF projects within Scottish waters
MD disposal sites Scotland	Shipping and Navigation Study Area	2024	Dredge spoil disposal sites within Scottish waters
RNLI historic incident data	Shipping and Navigation Study Area	2008-2023	RNLI historic incident database for analysis of past incidents
Marine Accident and Investigation Branch (MAIB) historic incident data	Shipping and Navigation Study Area	1992-2023	MAIB historic incident database for analysis of past incidents

6.11.3.2. Overview of the Baseline Environment

Supporting this Offshore Scoping Report, an initial desk-based review of literature and available data sources (see Table 6.11-1) has been undertaken; the findings are presented below, to provide an understanding of the baseline environment for Shipping and Navigation.

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Navigational Features

This section presents the baseline environment for navigational features, which have been identified through review of Admiralty Charts and UKHO Admiralty Sailing Directions. An overview of navigational features deemed relevant to the Shipping and Navigation Study Area are shown in Figure 6.11-1. These features may affect future and present vessel routeing and operations in the area.

The closest harbour is Scrabster harbour, an important fishing port for Thurso located within the Offshore Cable Corridor Area of Search approximately 58 nm (107.4 km) southeast of the Array Area. Scrabster harbour operates as a support base for supply and survey vessels, handles commercial cargoes, and is frequently utilised by cruise vessels and ferries to the Orkney Islands (Northlink Ferries regular Stromness to Scrabster ferry service). The harbour contains five artificial dock areas and unchartered lobster potting areas.


The harbour area for Scrabster occupies the majority of Thurso Bay, within which is a pilot boarding station and three dredge disposal sites (one of which is open and two are closed).

The closest offshore renewable project to the Array Area is the proposed Talisk Offshore Wind Project located 11 nm (20.4 km) to the west. This is a FLOW in the pre-planning stage with a 495 MW capacity. Also in the pre-planning stage is the 900 MW fixed offshore wind project Spiorad na Mara which is located 20 nm (37.0 km) southwest of the Shipping and Navigation Study Area and 30 nm (55.6 km) southwest of the Array Area.

There are two offshore renewable projects that intersect the Shipping and Navigation Study Area. The West of Orkney OWF is a 2,000 MW capacity project in the planning stage due to be located 26 nm (48.2 km) east of the Array Area due to be constructed from 2027. The West of Orkney OWF Array Area will extend approximately 7 nm (13.0 km) across the northwestern boundary of the Havbredey OWF Shipping and Navigation Study Area. The West of Orkney OWF proposed Cable Corridor is predominately within the Havbredey OWF Shipping and Navigation Study Area. The Pentland FLOW is a 100 MW capacity project in the pre-construction stage located within the southeast of the Offshore Cable Corridor Area of Search, approximately 46 nm (85.2 km) from the Array Area. The Pentland FLOW Cable Corridor is also within the Havbredey Offshore Cable Corridor Area of Search.

Intersecting the Shipping and Navigation Study Area are seven MoD PEXA:

- Two Areas of Intense Aerial Activity (AIAA) D712A and D712B intersect the southeast of the Array Area
- AIAA (D712C) intersects the southeast of the Offshore Cable Corridor Area of Search
- Area D803 Garvie Island is a land-based Firing Exercise Area that extends 5 nm (9.3 km) offshore from Cape Wrath to Faraid Head, intersecting the Offshore Cable Corridor Area of Search approximately 14 nm (25.9 km) southeast of the Array Area. When area D803 is in use, it is recommended that vessels keep clear, and fishing and anchoring are prohibited


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- Two Firing Danger Areas intersect the Shipping and Navigation Study Area, over 10 nm (18.5 km) east of the Array Area. The Cape Wrath areas D801 and D802 are operated in accordance with a Clear Range Procedure (CRP) where exercises and firing only take place when the area is considered to be clear of all shipping
- Military area “X5825” is a Submarine Exercise Area that intersects the Shipping and Navigation Study Area 11 nm (20.4 km) south of the Array Area

The closest IMO routeing measures are to the east and northeast of the Shipping and Navigation Study Area. These include Areas to be Avoided and Precautionary Areas surrounding the Orkney Islands and Shetland Islands, which indicate that vessels greater than 5,000 Gross Tonnage (GT) carrying oil or other hazardous cargoes should avoid the areas to reduce risk of pollution. Another IMO routeing measure is located approximately 9.5 nm (17.6 km) west of the Shipping and Navigation Study Area and 19 nm (35.2 km) southwest of the Array Area. This measure is a Deep Water Route (DWR) that passes north of the Isle of Lewis. The DWR is utilised by laden tankers greater than 10,000 GT. Admiralty charts recommend these vessels to avoid passing east of the Outer Hebrides through the Little Minch and North Minch, unless constrained by weather or any other case of *force majeure*.

Natural features of the local area such as land mass and tidal currents have a noted contribution to the navigational environment. Admiralty charts note that there are strong tidal streams in the Pentland Firth located approximately 0.5-15 nm (0.9 – 2.8 km) east of the Offshore Cable Corridor Area of Search and therefore laden tankers not bound for Flotta Oil Terminal and Scapa Flow are recommended to avoid transiting Pentland Firth in adverse weather or restricted visibility. There is a shallow bank of 22 m charted depth located 10 nm (18.5 km) east of the Array Area, within which Nun Rock is located 12 nm east (22.2 km) of the Array Area and charted at 4.3 m depth; each is marked with virtual aids to navigation. Within the Shipping and Navigation Study Area is Cape Wrath, the northwestern point of mainland UK and a key landmark for ocean routes. Surrounding Cape Wrath, there are shallow areas and hazards such as Duslic Rock located 1.2 nm (2.2 km) south of the Offshore Cable Corridor Area of Search. The prominent landmark at Cape Wrath is Cape Wrath Lighthouse with a white tower 20 m tall. The southern edge of the Offshore Cable Corridor Area of Search includes Sandside Bay which contains a small harbour and reefs up to 0.15 nm (0.3 km) offshore.

There are four subsea cables identified from the charts that run north to south through the Offshore Cable Corridor Area of Search from Dunnet Bay to the Orkney Islands, and Dunnet Bay to Iceland and the Faeroe Islands, as shown on Figure 6.11-2. Additionally, a further 2 power cables are present between Orkney and Clardon that make up the Pentland Firth power cable cluster which are not shown on Figure 6.11-2. Figure 6.11-2 also does not include any future/planned cables that are to be installed or removed in the area, including the Orkney Transmission Link power cable from Orkney to Caithness that is currently undergoing construction and is expected to be completed in 2027 for commissioning in 2028.

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Live and dead wreck locations known to the UKHO are described and presented in Figure 6.11-2. Three wrecks are within the Array Area, one wreck is categorised as non-dangerous and two are foul ground. Overall, there are 79 wrecks at 33-110 m depth within the Shipping and Navigation Study Area, including two historic wrecks located 8 nm (14.8 km) offshore from Faraid Head and 15.5 nm (28.7 km) to 18.5 nm (34.3 km) southeast of the Array Area. Admiralty charts note that historic wrecks are protected from unauthorised interference. There is one wreck at 3.2 m depth located within the Offshore Cable Corridor Area of Search, 0.2 nm (0.4 km) from the land in Dunnet Bay.

Admiralty charts contain the label “Scientific Instruments” within the Array Area and Shipping and Navigation Study Area; however, no commentary note is made on describing this. The label is understood to relate to data gathering scientific equipment for the vessel’s awareness but is not considered a navigational hazard.

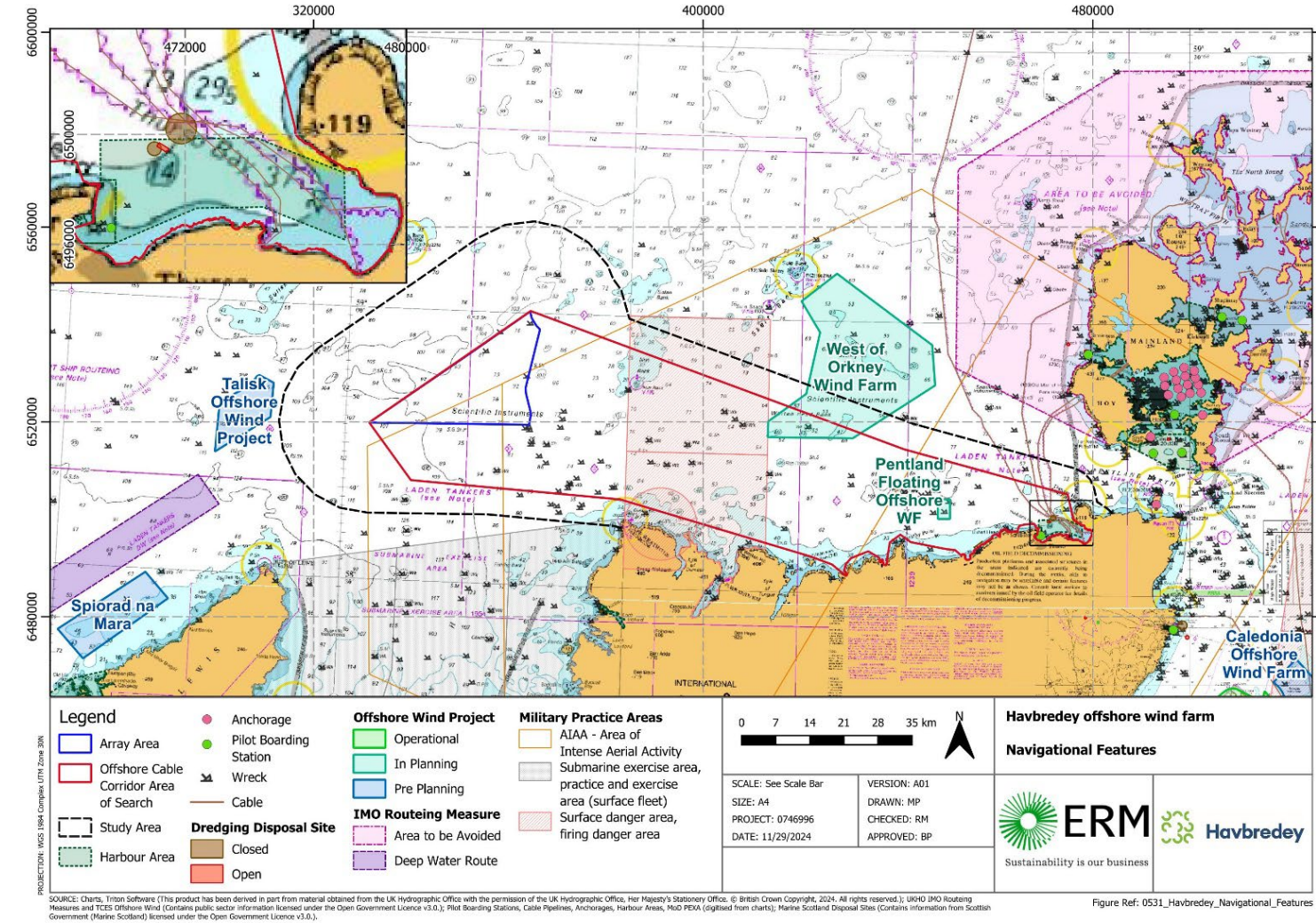



Figure 6.11-2 Navigational Features

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Vessel Traffic

Data from the EMODNet for 2023 and the RYA intensity of recreational vessels has been used to identify vessel traffic activity and is represented by vessel type in Figure 6.11-3. The EMODnet density indicates several main routes that intersect the Shipping and Navigation Study Area. An east to west route intersecting the Shipping and Navigation Study Area between Pentland Firth and Cape Wrath is heavily utilised by commercial vessels, fishing vessels, and other vessel types.

Cargo and tanker vessels that continue past Cape Wrath towards the DWR north of the Isle of Lewis pass within 6 nm (11.1 km) south of the Array Area. Several commercial routes intersect the Array Area in the northeastern to southwestern direction between the Outer Hebrides and the Norwegian Sea.

Passenger vessels rarely intersect the Array Area. However, regular ferry routes within the southeastern corner of the Offshore Cable Corridor Area of Search are operated by Northlink Ferries transiting from Scrabster harbour to Stromness in the Orkney Islands twice daily at a minimum.

Fishing vessel traffic is present throughout the Shipping and Navigation Study Area, particularly on approaches to Scrabster harbour. Three main directions of approach are from Cape Wrath, Pentland Firth, and west of the Orkney Islands.

Recreational intensity is low throughout the Shipping and Navigation Study Area with minimal recreational activity identified in the datasets within the Array Area. The majority of recreational activity is concentrated inshore at the Isle of Lewis and the Orkney Islands, with coastal transits crossing the Offshore Cable Corridor Area of Search.

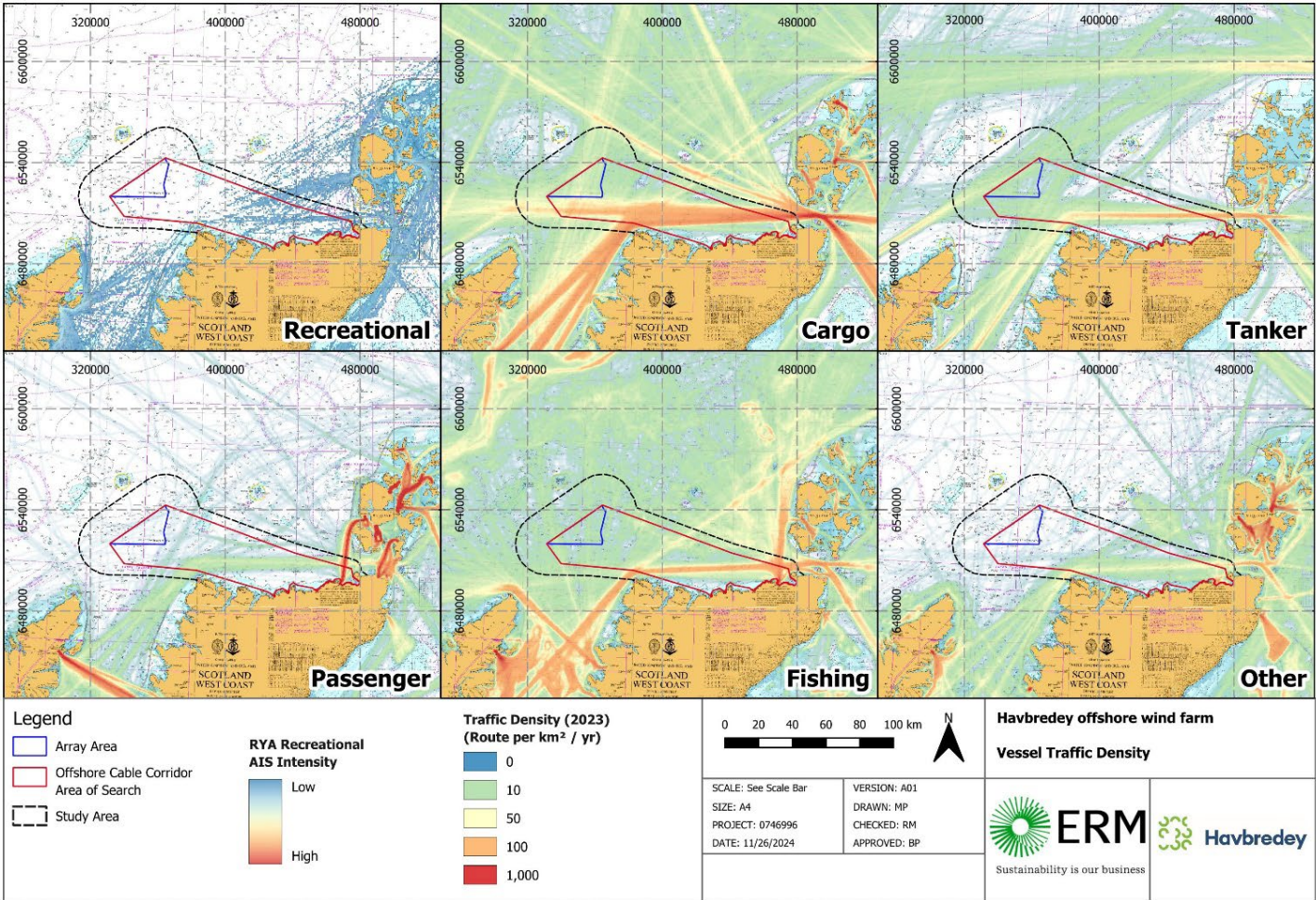



Figure 6.11-3 Vessel Density

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Historic Incidents

Historic incidents recorded by the Marine Accident Investigation Branch (MAIB) and RNLI have been collated and are presented in Figure 6.11-4. In processing the incidents, duplicate values recorded in both databases have been removed. Overall, there were 268 incidents within the Shipping and Navigation Study Area recorded between 1992 and 2023, 152 of which were mechanical/damage. Incidents were more concentrated inshore, particularly towards the eastern extent of the Offshore Cable Corridor Area of Search at Thurso Bay. The majority of incidents in Thurso Bay were mechanical/damage, grounding, personal injury, and other.

There was one historic incident recorded within the Array Area. This incident was mechanical/damage involving a yacht in 2018 which required assistance from the RNLI.

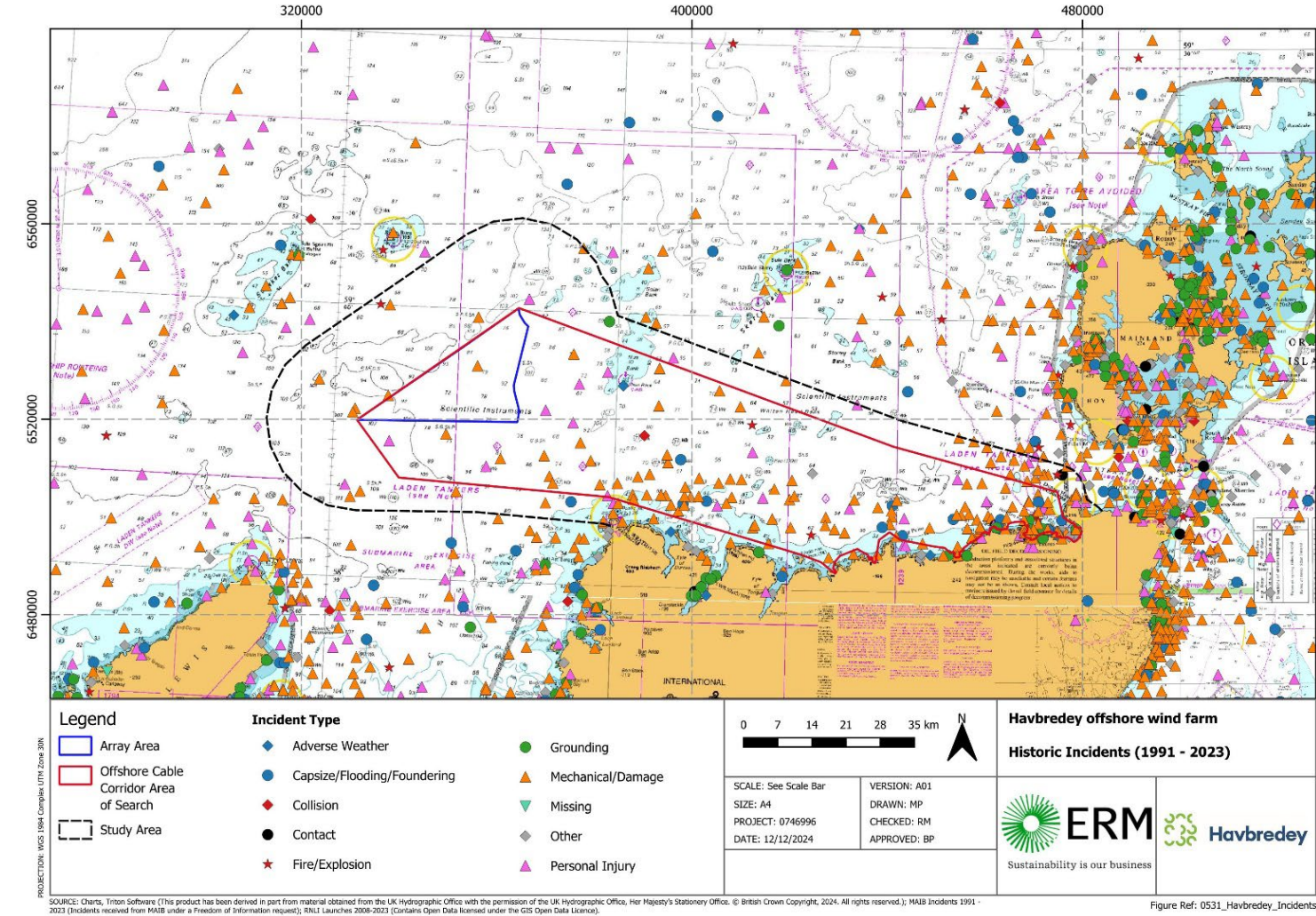



Figure 6.11-4 Historic Incidents


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6.11.4. DESIGNED IN MITIGATION


The designed in mitigation relevant to the Shipping and Navigation assessment, which have been incorporated into the current design of the Offshore Project, is outlined below in Table 6.11-2.

Table 6.11-2 Shipping and Navigation Designed in Mitigation Measures

ID	Designed In Mitigation Measure	How the Measure Will Be Secured
ID003	A CEMP and PEMP will be developed prior to construction and adhered to in compliance with legislative requirements and best practice standards and guidance.	Secured under Section 36 and/or Marine Licence consent conditions.
ID007	Best practice techniques will be employed through all phases of the Project, and measures will be provided in a MPCP, which will form part of the CEMP and PEMP. SOPEPs will be developed for the Project prior to construction.	Secured under Section 36 and/or Marine Licence consent conditions.
ID018	Standard industry practice and protocols will be adhered to, including application for safety zones during construction, major maintenance activities and decommissioning, and implementation of advisory clearance distances from vessels working on the Offshore Project.	Application under Energy Act 2004.
ID021	Consideration of MCA Marine Guidance Note (MGN) 654 and its annexes (particularly SAR annex 5).	Secured under Section 36 and/or Marine Licence consent conditions.
ID022	Adherence with Health and Safety Executive (HSE)/MCA guidance "Regulatory expectations on moorings for floating wind and marine devices" as appropriate (HSE/MCA, 2017).	Secured under Section 36 and/or Marine Licence consent conditions.
ID023	Appropriate marking of all offshore infrastructure on UKHO Admiralty Charts including where relevant an appropriate chart note.	Secured under Section 36 and/or Marine Licence consent conditions.
ID024	As required by MGN 654, pre-construction hydrographic surveys will fulfil the requirements of the International Hydrographic Organisation (IHO) Order 1a standard.	Secured under Section 36 and/or Marine Licence consent conditions.

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ID	Designed In Mitigation Measure	How the Measure Will Be Secured
ID025	Promulgation of information for vessel routes, timings and locations, safety zones and advisory passing distances as required via Notices to Mariners and Kingfisher bulletins.	Secured under Section 36 and/or Marine Licence consent conditions.
ID026	Development of, and adherence to a Construction Method Statement (CMS) with construction buoyage, where required, in agreement with Northern Lighthouse Board (NLB) prior to construction.	Secured under Section 36 and/or Marine Licence consent conditions.
ID027	Development of, and adherence to, an Emergency Response Cooperation Plan (ERCoP), developed in consultation with the MCA prior to construction.	Secured under Section 36 and/or Marine Licence consent conditions.
ID028	A VMP and Navigation Safety Plan will be developed prior to construction, including measures for coordination and communication with vessels and to manage project vessel movements.	Secured under Section 36 and/or Marine Licence consent conditions.
ID029	Suitable implementation and monitoring of cable protection in line with MGN 654 (via burial, or external protection where adequate burial depth as identified via CBRA is not feasible).	Secured under Section 36 and/or Marine Licence consent conditions.
ID030	Compliance of all Offshore Project vessels with international marine regulations as adopted by the Flag State, notably the International Regulations for Preventing Collisions at Sea (COLREGs) (IMO, 1974) and the International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974). All crew operating the vessels will have the required training and qualifications under national and international regulations.	Statutory requirement.
ID031	Blade clearance of at least 22 m above sea level MHWS, accounting for pitch and roll as per MGN 654.	Secured under Section 36 and/or Marine Licence consent conditions.
ID032	Wind turbine layout plan to be consulted on with MCA and NLB prior to construction.	Secured under Section 36 and/or Marine Licence consent conditions.

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ID	Designed In Mitigation Measure	How the Measure Will Be Secured
ID033	<p>Approval and implementation of a Lighting and Marking Plan (LMP), which will set out specific requirements in terms of aviation lighting to be installed on the wind turbines, as required under CAA (2016) prior to construction. Civil Aviation Publication (CAP) 393, Air Navigation: The Order and the Regulations (2016). The LMP will be prepared in consultation with the CAA, MoD, NLB and MCA and will consider requirements for aviation lighting as specified in Article 223 of the UK Air Navigation Order (ANO), 2016 and changes to International Civil Aviation Organisation Annex 14 Volume 2, Chapter 6, paragraph 6.2.4 promulgated in November 2016. The LMP will also consider the requirements of MGN 654 and its Annexes, IALA Recommendation O-139 (IALA, 2021a) and Guidance 71162 (IALA, 2021b).</p>	Secured under Section 36 and/or Marine Licence consent conditions.

6.11.5. SUMMARY OF KEY RECEPTORS, SENSITIVITIES AND LIKELY SIGNIFICANT EFFECTS

6.11.5.1. Likely Significant Effects

The scoping of likely significant effects on Shipping and Navigation receptors that may arise within the Shipping and Navigation Study Area via the proposed Offshore Project, are outlined in Table 6.11-3.




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Table 6.11-3 EIA Scoping Assessment for Shipping and Navigation


Potential Impact	Scoping Result	Justification	Assessment Method
Construction, Operation & Maintenance and Decommissioning			
Vessel interaction with turbine mooring systems	In	The presence of mooring lines associated with floating turbines may increase the likelihood of anchor or fishing gear interaction for third party vessels or affect surface navigation if located close enough to sea level.	Desktop study. Stakeholder consultation. Hazard Workshop as part of the Navigation Risk Assessment (NRA).
Vessel interaction with subsea infrastructure	In	The presence of additional subsea infrastructure may increase the likelihood of anchor or fishing gear interaction for third party vessels.	Desktop study. Stakeholder consultation. Hazard Workshop as part of the NRA.
Deviation of commercial vessels	In	Vessels may be displaced from their existing routes due to construction, operation and maintenance or decommissioning activities associated with the Offshore Project.	Desktop study. Stakeholder consultation. Hazard Workshop as part of the NRA.
Increased vessel to vessel collision risk	In	The presence of Offshore Project vessels during construction, operation and maintenance or decommissioning, as well as potential route deviations, may increase the likelihood of vessel to vessel encounters and subsequently increase the collision risk between vessels.	Desktop study. Stakeholder consultation. Hazard Workshop as part of the NRA. Collision Risk Modelling.
Increased contact/allision risk	In	Surface piercing structures associated with the Offshore Project construction, operation and maintenance or	Desktop study. Stakeholder consultation.

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Potential Impact	Scoping Result	Justification	Assessment Method
		decommissioning will pose a potential allision risk (powered or drifting) to passing vessels.	Hazard Workshop as part of the NRA. Allision risk modelling.
Increased grounding risk	In	Changes to vessel routeing as a result of the Offshore Project construction, operation and maintenance or decommissioning may lead to a potential increase in the risk of grounding. In addition, Offshore Project vessels could run aground whilst installing the offshore export cable.	Desktop study. Stakeholder consultation. Hazard Workshop as part of the NRA.
Reduction of emergency response capability due to increased incident rates or reduced access for SAR responders	In	The presence of the Offshore Project may result in an increased number of incidents requiring emergency response associated with work vessels or third-party vessels. Also, the presence of surface piercing structures may reduce access for SAR responders, such as helicopters.	Desktop study. Stakeholder consultation. Hazard Workshop as part of the NRA.
Interference with radar, communications and positioning systems	In	Marine navigation equipment may be affected by the presence of subsea infrastructure and surface piercing structures associated with the Offshore Project.	Desktop study. Stakeholder consultation. Hazard Workshop as part of the NRA.
Reduction in under keel clearance due to subsurface Offshore Infrastructure	In	The implementation of cable protection may reduce existing water depths and under keel clearance available to third party vessels.	Desktop study. Stakeholder consultation. Hazard Workshop as part of the NRA.

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Potential Impact	Scoping Result	Justification	Assessment Method
Reduced navigational safety during towage operations	In	Towage will be required to take floating wind turbines to the Array Area during construction, major maintenance or decommissioning. There is potential for impacts to occur during these operations including breakout and/or interaction with other vessels.	Desktop study. Stakeholder consultation Hazard Workshop as part of the NRA.
Breakout or loss of station of a floating wind turbine	In	A mooring system failure could cause a floating structure to lose station and create a hazard to navigation away from the Array Area.	Desktop study. Stakeholder consultation. Hazard Workshop as part of the NRA.
Impact on access and operation of port/harbours	In	Access to local ports, harbours and facilities may be impacted due to increased vessel traffic levels or obstructions associated with the Offshore Project.	Desktop study. Stakeholder consultation. Hazard Workshop as part of the NRA.
Impact on small vessel activity (fishing/recreational)	In	Fishing vessels and recreational vessel activity may be displaced due to the presence of the Offshore Project.	Desktop study. Stakeholder consultation. Hazard Workshop as part of the NRA.

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6.11.6. PROPOSED APPROACH TO EIA

6.11.6.1. Relevant Data Sources


Data sources listed within Table 6.11-1, alongside further secondary data sources including published and unpublished papers, journals and reports will be used to inform the EIA. A recent 12-month AIS dataset covering the Shipping and Navigation Study Area will also be acquired from third-party AIS data providers and considered with other datasets where appropriate. These sources may be further supplemented by any additional material identified during stakeholder consultation.

Desk-based data sources will be supplemented by conducting 28 days total site-specific and seasonally representative vessel traffic surveys for the EIA to collect AIS, radar and visual observation data, in accordance with MGN 654 requirements. As such, the proposed surveys will consist of 14 days of data collected in summer and 14 days of data collected in winter. Appropriate dates for the surveys will be scheduled to ensure site-specific data is collected no more than 24 months prior to application submission.

6.11.6.2. Consultation

Consultation and engagement will be key to confirm the methodology and approach to the assessment. Throughout the duration of the Offshore Project, collaboration between the Offshore Project team and external stakeholders will be established. Organisations that will be consulted with respect to this specific EIA topic, include:

- MCA
- NLB
- MoD
- UK Chamber of Shipping
- Local ports and harbours (including, but not limited to, Orkney Islands Council Harbour Authority, Scrabster Port, Stornoway Port Authority, The Highland Council Harbours Authority, Castletown Harbour and other active harbours identified within the NRA process)
- Local yacht clubs
- Ferry operators (including NorthLink)
- Oil and gas operators
- RYA Scotland
- Cruising Association
- Other Commercial regular runners/operators identified through vessel traffic analysis
- Fisheries, including:
 - The Outer Hebrides RIFG

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- The North West Coast RIFG
- The North East Coast RIFG
- Orkney RIFG
- Orkney Fisheries Association
- MNWFA
- Local Fishing Skippers
- SFO
- SPFA Ltd
- SFF
- SWFPA Ltd
- SSA
- Scottish Creel Fishermen’s Federation
- North and West District Salmon Fisheries Board
- Northern District Salmon Fishery Board
- Scrabster Harbour Trust
- Community Inshore Fisheries Alliance
- Shetland Fishermen’s Association

6.11.6.3. Policy, Legislation and Guidance

The assessment of Shipping and Navigation will consider the legislation, policy and guidance listed below (Table 6.11-4).

Table 6.11-4 Legislation, Policy and Guidance Relevant to the Shipping and Navigation Assessment

Relevant Legislation, Policy and Guidance
HSE/MCA (2017). Regulatory expectations on moorings for floating wind and marine devices
IALA (2021a and 2021b). O-139 the Marking of Man-Made Offshore Structures and Guidance G1162
IMO (1972/77). COLREGs – Annex 3
IMO (1974). International Convention for the Safety of Life at Sea (SOLAS)
IMO (1982). The United Nations Convention on the Law of the Sea (UNCLOS)
IMO (1995). The International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW), as amended
IMO (2018). Revised Guidelines for Formal Safety Assessment (FSA)
MCA (2021). MGN 654 Safety of Navigation: Offshore Renewable Energy Installations (OREI) – Guidance on UK Navigational Practice, Safety and Emergency Response and its annexes
MCA (2021b). Methodology for Assessing the Marine Navigational Safety Risks & Emergency Response of OREI
MCA (2021c). Annex 1 to MGN 654, Methodology for Assessing Marine Navigational Safety & Emergency Response Risks of OREI

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Relevant Legislation, Policy and Guidance
MCA (2021d). Annex 5 to MGN 654, Offshore Renewable Energy Installations: Requirements Guidance and Operational Considerations for SAR and Emergency Response
MCA (2022). MGN 372 Amendment 1 (M+F) OREI: Guidance to Mariners Operating in the Vicinity of UK Offshore Renewable Energy Infrastructure
NASH Maritime and Osprey CSL (2023). Floating Offshore Wind Centre of Excellence Navigational Planning and Risk Assessment Summary Report
PIANC (2018). WG161-2018: Interaction between Offshore Windfarms and Maritime Navigation
RYA (2019). The RYA's Position on Offshore Renewable Energy Developments: Paper 1 – Wind Energy

6.11.6.4. Assessment Methodology


The assessment will follow the methodology described in Chapter 4: Proposed Approach to EIA. Further refinement of the methodology will be undertaken prior to the chapter being written as part of the baseline and stakeholder engagement. Cumulative and transboundary effects are also discussed in Chapter 4: Proposed Approach to EIA, and assessment of these will apply to Shipping and Navigation.

The main aim of the Shipping and Navigation assessment is to further understand and characterise the existing environment in the Shipping and Navigation Study Area. A greater understanding of the Shipping and Navigation receptors will assist in providing a firm baseline for any potential effect of the Offshore Project.

The principal guidance for assessing impacts to shipping and navigation is described in MGN 654 (MCA, 2021a). Annex 1 of MGN 654 describes the methodology by which an NRA should be undertaken, including data collection and consultation requirements.

The baseline data sources (Section 6.11.3.1), and further data sources (Section 6.11.6.1) will be supported by a formal consultation process. This process includes a Hazard Workshop, which is a standard and effective consultation activity. It is recommended under MGN 654 that a Hazard Workshop is undertaken as part of the development of an NRA for OWF developments. The workshop allows a working group of local users and key stakeholders (identified from the baseline and statutory consultees) to further risk assess vessel traffic movements and the potential interactions within the Offshore Project.

Collision and Allision Risk Modelling will be undertaken using the IALA Waterway Risk Assessment Program (IWRAP) Mk II software to analyse the proportion of the vessel traffic that may interact with the Array Area based on the disposition of the baseline (and future baseline) traffic. The model allows for quantitative vessel collision and contact likelihood modelling which will be undertaken on the baseline and wind turbine layouts. IWRAP Mk II is a quantitative tool for calculating the frequency of collisions, groundings and

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allisions for navigating vessels in a given waterway. The tool was developed by IALA to support coastal states in conducting risk assessments to address obligations under SOLAS Chapter V.

As per MGN 654, the NRA will follow the IMO’s FSA methodology, an internationally recognised approach for conducting maritime risk assessments. The FSA is a structured and systematic methodology, aimed at enhancing maritime safety, including protection of life, health, the marine environment and property, by identifying the hazards, analysing the risk, identifying additional risk mitigation if required, reviewing cost-benefit (if required), and providing recommendations for decision-making.

Hazards will be identified, and their likelihood and consequence scored using a structured risk matrix to produce a risk score. This assessment will bring together the thorough baseline navigational characterisation, quantitative risk modelling, consultation feedback, Hazard Workshop outputs, analysis results, lessons learnt from previous developments and expert judgement. Where necessary, risk controls will be identified to mitigate any unacceptable risks and reduce the risks to As Low as Reasonably Practicable (ALARP). This will be presented in the form of a hazard log and used to inform the Offshore EIA Report. The hazard log will also be used to identify standard and additional mitigation measures required to demonstrate that the hazards are broadly acceptable or tolerable on the basis of ALARP declarations, in line with regulatory requirements.


Magnitude and sensitivity are required to be considered together to determine the significance of an effect. The definitions for magnitude and sensitivity will be dependent on the findings of the NRA and will be developed to be consistent with the methodology used for other topics.

The Offshore EIA Report will also consider inter-related effects across the Offshore Project phases or across a receptor group; the potential cumulative effects arising from the Offshore Project in combination with other projects; and transboundary impacts upon Shipping and Navigation due to the Offshore Project. For the CEA, a 50 nm (92.6 km) screening area will be utilised for identification of the other plans, projects and activities that may result in spatial or temporal cumulative effects on shipping and navigation for inclusion in the assessment.

6.11.7. SCOPING QUESTIONS FOR CONSULTEES

Scoping questions for consultees in relation to the Shipping and Navigation Assessment include:

1. Do you agree that the Shipping and Navigation Study Area (Section 6.11.2) is sufficient to characterise the Shipping and Navigation baseline for the EIA?
2. Do you agree with the proposed data and data sources (Sections 6.11.3.1 and 6.11.6.1) intended to be used for EIA stage, including the proposed site-specific vessel traffic surveys, are sufficient to characterise the Shipping and Navigation baseline for the EIA?

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3. Are there any additional or specific organisations (Section 6.11.6.2) that should be included throughout the stakeholder engagement process?
4. Do you agree with the assessment methodology proposed to be undertaken within the Offshore EIAR?
5. Have all the likely significant effects (Section 6.11.5.1) resulting from the Offshore Project been identified for Shipping and Navigation users?
6. Is the proposed approach and methodology for Shipping and Navigation (Section 6.11.6.4) appropriate for assessing the risks and likely significant effects resulting from the Offshore Project?
7. Do you agree that the designed in mitigation measures described (Section 6.11.4) are adequate for managing and mitigating the potential impacts of the Offshore Project on Shipping and Navigation receptors?

6.11.8. REFERENCES

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6.12. RADAR AND AVIATION

6.12.1. INTRODUCTION

This chapter of the Offshore Scoping Report provides an overview of the baseline environment for Radar and Aviation within the Array Area and Offshore Cable Corridor Area of Search. It also includes a scoping assessment of likely significant effects for the relevant receptors, from the construction, operation (including maintenance), and decommissioning phases of the Offshore Project.


The potential effects of WTGs on Radar and Aviation receptors are widely publicised, but the primary concern is one of safety. Despite innumerable subtleties in the actual effects, there are three dominant scenarios that lead to potential impacts:

- Physical obstruction: WTGs can present a physical obstruction to aircraft.
- Impacts on aviation radar systems and the provision of radar-based Air Traffic Services (ATS): WTGs can create unwanted radar clutter which appears on radar displays and can affect the provision of Air Traffic Services (ATS) to pilots. Radar clutter (or false radar returns) can confuse air traffic controllers making it difficult to differentiate between aircraft and those radar returns resulting from the detection of WTGs. Furthermore, the appearance of multiple false targets in close proximity can generate false aircraft tracks which can replace the returns of 'real' aircraft and take them away from the true aircraft position. It should be noted that impacts on radar systems are only possible if the WTG blades are moving, therefore this impact is generally applicable to the operation and maintenance phase, or at the time of blade tip installation depending at which location that takes place (i.e. within the array area or elsewhere).
- Impacts on Communication, Navigation and Surveillance (CNS) equipment: A wide range of systems, together with air-ground communications facilities, can be adversely affected by development of infrastructure projects; specifically, when located within the physical safeguarding zones of CNS equipment.

6.12.2. STUDY AREA

The Radar and Aviation Study Area is defined as a 9 nm (17 km) buffer around the Array Area which will enable the impact on aviation in the immediate vicinity to be determined; in particular in respect of low-visibility helicopter operations into offshore installations (oil and gas platforms).


A Secondary Radar and Aviation Study Area is defined by the range of the affected aviation receptors; in particular, Air Traffic Control (ATC) and Air Defence (AD) Primary Surveillance Radars (PSRs). The Radar and Aviation Study Area covers radars in the north of Scotland that could potentially detect WTGs within the Array Area; with the extent of the Radar and Aviation Study Area defined by the furthest potential aviation receptor. The operating range of aviation radars can be up to 200 nm (370 km); however, it is only the likely radar coverage over the Array Area that needs to be taken into account, as the question of whether the

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WTGs themselves are visible to radar is the determining factor relating to aircraft safety. This has assisted in identifying whether any relevant PSRs, and stakeholders, may be affected. Impacts from offshore infrastructure will be considered for receptors positioned both below MHWS, and above MHWS where applicable.

If required, RCS(s) will be located along the offshore export cable corridor. As the precise location(s) of RCS(s) are not yet known, these have been excluded from the Radar and Aviation Study Area at the scoping stage. If the need for RCS(s) is confirmed as the Offshore Project design matures during the consenting process, the RCS location(s) will be added to the Radar and Aviation Study Area defined above for assessment within the EIA.

The Radar and Aviation Study Area is illustrated in Figure 6.12-1 together with the locations of potentially affected aviation receptors.

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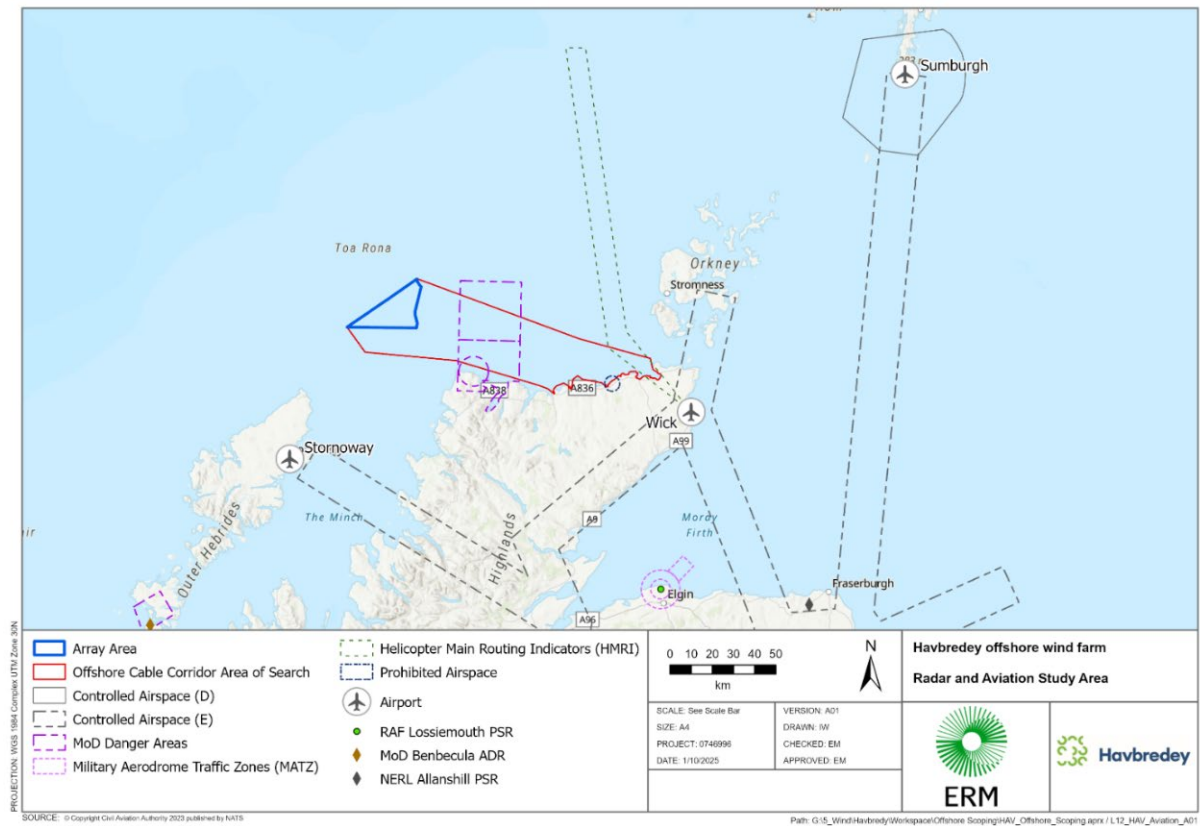



Figure 6.12-1 Radar and Aviation Study Area¹⁷

¹⁷ There are 5 classifications of controlled airspace (A-E) of which 4 are used in the UK: A, C, D and E. Please see Civil Aviation Authority (CAA) website for definitions of (D) and (E) controlled airspace ([Controlled Airspace](#) | [CAA Infringement Tutorial](#)).

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6.12.3. BASELINE ENVIRONMENT

6.12.3.1. Data Sources

Data sources used to inform this Radar and Aviation Chapter of the Offshore Scoping Report are presented in Table 6.12-1.


Table 6.12-1 Summary of Key Data Sources for Radar and Aviation

Source	Spatial Coverage	Year	Summary
CAA 1:500,000 Visual Flight Rules (VFR) Aviation Chart	UK	2024	Enables pilots to determine their position, safe altitude and route to a destination, and highlights navigation aids and alternative landing areas.
United Kingdom Integrated Aeronautical Information Package (UK IAIP)	UK	2024	Provides comprehensive information on UK civilian aerodromes and aviation procedures within UK airspace.
UK Military Aeronautical Information Publication (Mil AIP)	UK	2024	Provides comprehensive information on UK military aerodromes and guidance to military aircrew on in-flight navigation procedures.
NATS Self-Assessment Maps	UK	2024	Enables wind farm applicants to ascertain whether their proposed development is anticipated to have an impact upon NATS infrastructure and operations.
Scottish NPF4	Scotland	2023	Outlines national planning policy in Scotland.

6.12.3.2. Overview of the Baseline Environment

Based on an initial desk-based review of literature and available data sources (see Table 6.12-1) the key Radar and Aviation receptors potentially impacted by OWF developments are:

- Civil airport Instrument Flight Procedures (IFPs)
- Military aerodrome IFPs
- Civil ATC radar
- Military ATC radar
- Military AD radar
- Low flying operations (military and UK SAR)
- Helicopter Main Route Indicators (HMRIs)

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- Offshore helicopter installations (oil and gas platforms)
- Local Airspace Restrictions (Prohibited/Restricted/Danger Areas and Military PEXAs)
- Meteorological (Met) Office radar

The aviation environment within the vicinity of the Offshore Project can be described as follows:

Airspace

The Array Area is located approximately 14.6 nm (27 km) off the north-west coast of Scotland. In aviation terms, the Array Area is situated in a relatively uncomplicated piece of airspace but with active military Dangers Areas (D801, D802 and D803) located 10 nm (18 km) to the east.

Civil Airports

The nearest major civil airport to the Array Area is Stornoway Airport, located approximately 37 nm (69 km) to the southwest. The obstacle safeguarding area for airports of this nature is 30 nm (56 km), therefore the proposed WTGs will not adversely affect Stornoway Airport's IFPs.

Civil ATC Radars


The nearest civil ATC PSRs to the Array Area are the Inverness Airport PSR and the NATS Allanshill and Perwinnes PSRs all of which are located more than 85 nm (157 km) to the southeast. According to NATS Self-Assessments maps (Table 6.12-1), there is no possibility that the proposed WTGs will be in radar line of sight (RLOS) of these radars. NATS also have Secondary Surveillance Radars (SSRs) located at Stornoway Airport 37 nm (69 km) to the southwest of the Array Area, and at Sumburgh Airport 130 nm (240 km) to the northeast of the Array Area. In accordance with CAP 764, effects are typically only a consideration when the turbines are located very close to the SSR i.e. within 5.5 nm (10 km). Consequently, no civil ATC radar systems are expected to be affected by the Offshore Project.

Military ATC Radars

The nearest military ATC radar to the Array Area is the Lossiemouth ATC radar which is located more than 90 nm (167 km) to the southeast. The Lossiemouth ATC radar has an operational range of 60 nm (111 km); therefore, there is no possibility that the proposed WTGs will be in RLOS of the radar. Consequently, no military ATC radar systems will be affected by the Offshore Project.

Military AD Radars

The nearest military AD radar to the Array Area is located at Remote Radar Head (RRH) Benbecula, 85 nm (157 km) to the southwest. Previous assessments of OWF impacts on AD radar indicates that there is no possibility that the proposed WTGs will be in RLOS of the radar. Consequently, no military AD radar systems will be affected by the Offshore Project.

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Low flying (including UK SAR)

The Array Area is located more than 12 nm (22 km) from the UK coastline and, therefore, is technically outside the UK Military Low Flying System; however, it is recognised that military aircraft may still be required to operate at low-level in the vicinity of the Offshore Project. Installation and presence of WTGs can pose a physical obstruction to aviation operations and WTGs can be difficult to see from the air, particularly in poor meteorological conditions, leading to a potential increase in obstacle collision risk. Furthermore, during the construction phase, the presence and movement of installation vessels (with onboard cranes) may also present a potential obstacle collision risk to aircraft operations. Military aircraft can operate down to 100 ft above sea surface level.

UK SAR helicopters conducting operational missions are not constrained by the normal rules of the air and operate in accordance with their Air Operator Certificate, which allows them flexibility to manoeuvre, as required, for the particular mission being carried out.

HMRI

HMRI are established to support the transport of personnel and logistics to offshore oil and gas installations. HMRI provide a network of offshore routes used by civilian helicopters to facilitate an obstacle free zone for safe flight when in-flight Visual Meteorological Conditions (VMC) cannot be met.


The nearest HMRI to the proposed WTGs is HMRI YANKEE which routes south to north 45 nm (83 km) to the east of the Array Area; see Figure 6.12-1. As outlined in CAP 764, CAA guidance is that, provided there are no WTGs within 2 nm (3.7 km) of an HMRI, then helicopter operations on HMRI should not be affected.

Offshore helicopter installations (oil and gas platforms)

CAA recommend that wind farm developers consult with the owners/operators of offshore helicopter installations when a development is within 9 nm (17 km) of any proposed wind turbine developments. There are no offshore helicopter installations within 9 nm (17 km) of the Array Area; consequently, helicopter operations into offshore installations are not expected to be affected by the Offshore Project.

Local Airspace Restrictions (Prohibited/Restricted/Danger Areas and Military PEXAs)

The western boundaries of military Danger Areas D801, D802 and D803 are located 10 nm (18 km) to the east of the Array Area. D801 and D802 are activated periodically, from the surface up to 55,000 ft above MSL, whereas, D803 is activated periodically, from the surface up to 40,000 ft above MSL; all are used for air to ground bombing exercises. While the Array Area is outside the lateral boundaries of all three Danger Areas, the northern boundary of the Offshore Cable Corridor Area of Search routes through D801 and the southern boundary of the Offshore Cable Corridor Area of Search routes through D802 and D803. As the Offshore Cable Corridor Area of Search will be located within the lateral boundaries of these Danger Areas,

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the MoD will need to be consulted. The results of this consultation will be covered in detail in the Offshore EIAR.

Met Office Radar


The closest Met Office radar system is located at Druim a'Starraig near Stornoway Airport, 37 nm (69 km) to the southwest, which is outside the Met Office's designated 11 nm (20 km) safeguarding area for radars of this nature.

6.12.4. DESIGNED IN MITIGATION

The designed in mitigation relevant to the Radar and Aviation assessment, which have been incorporated into the current design of the Offshore Project, is outlined below in Table 6.12-2.

Table 6.12-2 Radar and Aviation Designed in Mitigation Measures

ID	Designed In Mitigation Measure	How the Measure Will Be Secured
ID033	Approval and implementation of a LMP, which will set out specific requirements in terms of aviation lighting to be installed on the wind turbines, as required under CAA (2016) prior to construction. CAP 393, Air Navigation: The Order and the Regulations (2016). The LMP will be prepared in consultation with the CAA, MoD, NLB and MCA and will consider requirements for aviation lighting as specified in Article 223 of the UK ANO, 2016 and changes to International Civil Aviation Organisation Annex 14 Volume 2, Chapter 6, paragraph 6.2.4 promulgated in November 2016. The LMP will also consider the requirements of MGN 654 and its Annexes, IALA Recommendation O-139 (IALA, 2021a) and Guidance 71162 (IALA, 2021b).	Secured under Section 36 and/or Marine Licence consent conditions and LMP.
ID034	Development of, and adherence to, an ERCoP in consultation with the MCA prior to construction. An ERCoP will be produced for the Offshore Project to ensure the emergency response plan will provide sufficient information about the Offshore Project, actions and details required in the event of an emergency situation. The ERCoP will refer to the marking and lighting of the WTGs and will consider helicopters undertaking SAR operations when rendering assistance to vessels and persons in the	Secured under Section 36 and/or Marine Licence consent conditions.

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ID	Designed In Mitigation Measure	How the Measure Will Be Secured
	vicinity of the Array Area. MCA recommended standards and procedures are to be followed, and appropriate lighting and marking is to be in place to facilitate aeronautical safety.	
ID035	All structures of more than 91.4m in height will be charted on aeronautical charts and reported to the Defence Geographic Centre, which maintains the UK's database of tall structures (Digital Vertical Obstruction File) at least ten weeks prior to construction.	Secured under Section 36 and/or Marine Licence consent conditions and LMP and Design Specification and Layout Plan (DSLPL).
ID036	Any temporary obstacles associated with wind farms which are of more than 91.4 m in height (e.g. construction infrastructure such as cranes) are to be alerted to aircrews by means of the Notice to Aviation (NOTAM) system.	Secured under Section 36 and/or Marine Licence consent conditions.
ID037	CAA will be informed of the locations, heights and lighting status of the WTGs, including estimated and actual dates of construction and the maximum heights of any construction equipment to be used, prior to the start of construction.	Secured under Section 36 and/or Marine Licence consent conditions.

6.12.5. SUMMARY OF KEY RECEPTORS, SENSITIVITIES AND LIKELY SIGNIFICANT EFFECTS

The key receptors for Radar and Aviation are:

- Low flying operations (military and UK SAR)
- Military operations within Danger Areas D801, D802 and D803

6.12.5.1. Likely Significant Effects

The scoping of likely significant effects on Radar and Aviation receptors which may arise within the Radar and Aviation Study Areas via the Offshore Project, is outlined in Table 6.12-3.


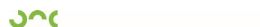

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Table 6.12-3 EIA Scoping Assessment for Radar and Aviation


Potential Impact	Scoping Result	Justification	Assessment Method
Construction and Decommissioning			
Civil airport IFPs	Out	The proposed wind turbines are not within the safeguarding area of any civil airports. It is proposed that this impact will be scoped out of further consideration within the Offshore EIAR.	N/A
Military aerodrome IFPs	Out	The proposed WTGs are not within the safeguarding area of any military aerodromes. It is proposed that this impact will be scoped out of further consideration within the Offshore EIAR.	N/A
Low flying operations (military and UK SAR)	In	Installation, and presence of, wind turbines can pose a physical obstruction to aircraft. Furthermore, during construction, the presence and movement of installation vessels (with onboard cranes) may also present a potential obstacle collision risk.	A LMP will be developed pre-construction with all relevant aviation stakeholders and details of the proposed WTGs will be included in aviation documentation and displayed on aviation charts.
HMRIs	Out	In line with CAA guidance (CAP 764), the proposed WTGs are more than 2 nm (3.7 km) from any HMRIs. Consequently, helicopter operations on HMRIs are not expected to be affected by the Offshore Project. It is	N/A

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Potential Impact	Scoping Result	Justification	Assessment Method
		proposed that this impact will be scoped out of further consideration within the Offshore EIAR.	
Offshore helicopter installations (oil and gas platforms)	Out	In line with CAA guidance (CAP 764), the proposed WTGs are more than 9 nm (17 km) from any offshore helicopter installation. Consequently, helicopter operations into offshore installations are not expected to be affected by the Offshore Project. It is proposed that this impact will be scoped out of further consideration within the Offshore EIAR.	N/A
Military operations within Danger Areas D801, D802 and D803	In	The Offshore Cable Corridor Area of Search lies within the lateral boundaries of Danger Areas D801, D802 and D803 which are activated periodically by MoD by means of the NOTAM system. D801 and D802 are activated periodically from surface level up to 55,000 ft above MSL and D803 is activated periodically from surface level up to 40,000 ft above MSL.	Engagement with MoD regarding potential impact on aviation operations within Dangers Areas D801, D802 and D803 in order to inform MoD's response to this Offshore Scoping Report.
Operation and Maintenance			
Civil ATC radar	Out	The proposed WTGs are not within radar coverage of any civilian ATC PSR systems. It is	N/A

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Potential Impact	Scoping Result	Justification	Assessment Method
		proposed that this impact will be scoped out of further consideration within the Offshore EIAR.	
Military ATC radar	Out	The proposed WTGs are not within radar coverage of any military ATC PSR systems. It is proposed that this impact will be scoped out of further consideration within the Offshore EIAR.	N/A
Military AD radar	Out	The proposed WTGs are not within radar coverage of any military AD PSR systems. It is proposed that this impact will be scoped out of further consideration within the Offshore EIAR.	N/A
Low flying operations (military and UK SAR)	Out	This impact is scoped in for the construction phase only. Mitigation will have to be implemented prior to construction and will already be in place for the operation and maintenance and decommissioning phases.	N/A
Military operations within Danger Areas D801, D802 and D803	Out	This impact is scoped in for the construction phase only. Mitigation will have to be implemented prior to construction and will already be in place for the operation and maintenance and decommissioning phases.	N/A

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Potential Impact	Scoping Result	Justification	Assessment Method
Met Office radar	Out	The proposed WTGs are not within radar coverage of any Met Office radar systems. It is proposed that this impact will be scoped out of further consideration within the Offshore EIAR.	N/A

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6.12.6. PROPOSED APPROACH TO EIA

6.12.6.1. Relevant Data Sources

Data sources listed within Table 6.12-1, alongside further secondary data sources including published and unpublished papers, journals and reports will be used to inform the EIA. These sources may be further supplemented by any additional material identified during stakeholder consultation.

In addition to the data sources highlighted in Table 6.12-1, the following additional data sources will be used to inform the EIA:

- Beatrice OWF Ltd Environmental Statement (ES) (2012)
- Moray East OWF ES (2012)
- Dounreay Tri ES (2016)
- Moray West OWF EIAR (2018)
- Pentland FLOW EIAR (2022)
- West of Orkney OWF Offshore EIAR (2023)

6.12.6.2. Consultation

Consultation and engagement will be key to confirm the methodology and approach to the assessment. Throughout the duration of the Offshore Project, collaboration between the Offshore Project team and external stakeholders will be established. Organisations that will be consulted with respect to this specific EIA topic, include:


- CAA
- MoD
- MCA
- NLB

6.12.6.3. Policy, Legislation and Guidance

The assessment of Radar and Aviation will consider the legislation, policy and guidance listed below (Table 6.12-4).

Table 6.12-4 Legislation, Policy and Guidance Relevant to the Radar and Aviation Assessment.

Relevant Legislation, Policy and Guidance
Legislation and Policy
Environmental Assessment (Scotland) Act, 2009
Scotland's National Marine Plan, 2015
Sectoral Marine Plan

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Relevant Legislation, Policy and Guidance
CAP 393 – Air Navigation, The Order and the Regulations (Version 6, 12th February 2021)
CAP 437 – Standards for Offshore Helicopter Landing Areas (Version 9, 10th February 2023)
CAP 670 – ATS Safety Requirements (CAA, 2019)
CAP 764 – CAA Policy and Guidelines on Wind Turbines (CAA, 2016)
CAP 774 – The UK Flight Information Services (CAA, Version 4, 15th December 2021)
Military Aviation Authority (MAA) Regulatory Publication 3000 Series (2021)
MAA Manual of Military Air Traffic Management (MAA, 2019)
Guidance
MoD Obstruction Lighting Guidance (1st January 2020; MoD, 2020)
CAA 1:500,000 Visual Flight Rules (VFR) Aviation Chart (CAA, 2024)
CAP 168 – Licensing of Aerodromes (Version 12, 14th January 2022)
UK Integrated Aeronautical Information Package (UK AIP) (CAA, 2024)
UK Mil AIP (MoD, 2024)
MGN 654 – Safety of Navigation: Offshore Renewable Energy Installations (OREIs), Guidance on UK Navigational Practice, Safety and Emergency Response (28th April 2021)

6.12.6.4. Assessment Methodology

The assessment will follow the principles of the methodology described in Chapter 4: Proposed Approach of EIA. Further refinement of the methodology will be undertaken prior to the chapter being written as part of the baseline and stakeholder engagement. Cumulative and transboundary effects are also discussed in Chapter 4: Proposed Approach to EIA, and assessment of these will apply to Radar and Aviation.

The main aim of the Radar and Aviation assessment is to further understand and characterise the existing environment in the Radar and Aviation Study Areas. A greater understanding of the key receptors identified, including military and UK SAR low flying operations and military operations within Danger Areas D801, D802 and D803, will assist in providing a firm baseline for any potential effect of the Offshore Project.

The methodology used for the Radar and Aviation assessment is a desk-based review using the data sources as described in Table 6.12-1. However, defining categories of receptor sensitivity and magnitude of impact is not appropriate for aviation as baseline aviation activities and equipment are highly sensitive to impacts and any magnitude of restriction on, or compromise to, activities or equipment (without designed in mitigation) is considered to be high. Therefore, the sensitivity of receptor and magnitude of impact will be explained via professional reasoning and judgement rather than via definitions of different categories. These judgements will feed into the determination of significance as discussed below.

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Significance Criteria

The impact assessment matrix provided in Chapter 4: Proposed Approach of EIA will be used to determine the significance of an effect. Each level of significance can be described as follows:

- Major - Regular, frequent or permanent effects which require changes to existing operational and/or technical practice in order to mitigate adequately, or which are not capable of being mitigated adequately
- Moderate - Periodic effects experienced which may require alterations to existing operational practice
- Minor - Occasional effects experienced which do not require any alteration of existing operational and technical practice
- Negligible - Normally no measurable change from baseline conditions which therefore do not require any alteration of existing operational and technical practice

For the purposes of this assessment:

- A level of effect of moderate or more will be considered a 'significant' effect
- A level of effect of minor or less will be considered 'not significant'


Effects of moderate significance or above are therefore considered important in the decision-making process, whilst effects of minor significance or less warrant little, if any, weight in the decision-making process.

Stakeholder consultation will be undertaken at pivotal points throughout the EIA process to ensure that the approach, including the application of the evidence base, satisfies the requirements of both stakeholders and regulators, such as after scoping, prior to commencement, and at the draft production of the chapter during the Offshore EIAR.

6.12.7. SCOPING QUESTIONS FOR CONSULTEES

Scoping questions for consultees in relation to the Radar and Aviation Assessment include:

1. Do you agree that the data sources referenced above to inform the baseline are valid for the purposes of this scoping assessment?
2. Have all Radar and Aviation receptors and potential impacts that could result from the Offshore Project been identified?
3. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts for Radar and Aviation?
4. Do you agree with the assessment methodology proposed to be undertaken within the Offshore EIAR?

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5. Do you agree that the designed in mitigation measures described provide a suitable means for managing and mitigating the relevant potential effects of the Offshore Project on Radar and Aviation receptors?

6.12.8. REFERENCES

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6.13. INFRASTRUCTURE, OTHER SEA USERS, TOURISM AND RECREATION

6.13.1. INTRODUCTION

This chapter of the Offshore Scoping Report provides an overview of the baseline environment for Infrastructure, Other Sea Users, Tourism and Recreation within the Array Area and Offshore Cable Corridor Area of Search. It also includes a scoping assessment of likely significant effects for the relevant receptors, from the construction, operation (including maintenance), and decommissioning phases of the Offshore Project.

6.13.2. STUDY AREA

The Infrastructure, Other Sea Users, Tourism and Recreation Study Area has been defined as the Array Area and Offshore Cable Corridor Area of Search, plus a 10 nm (18.5 km) buffer, as shown in Figure 6.13-1. This is considered adequate to capture relevant receptors that fall within the scope of Infrastructure, Other Sea Users, Tourism and Recreation. The scoping design envelope extends to MHWS meaning impacts from offshore infrastructure are considered for receptors below MHWS (impacts from offshore infrastructure will be considered for receptors above MHWS only where applicable). It should be noted that the topic-specific study area will vary depending on the nature and scale of each receptor, or associated pathway, that could result in a receptor effect.

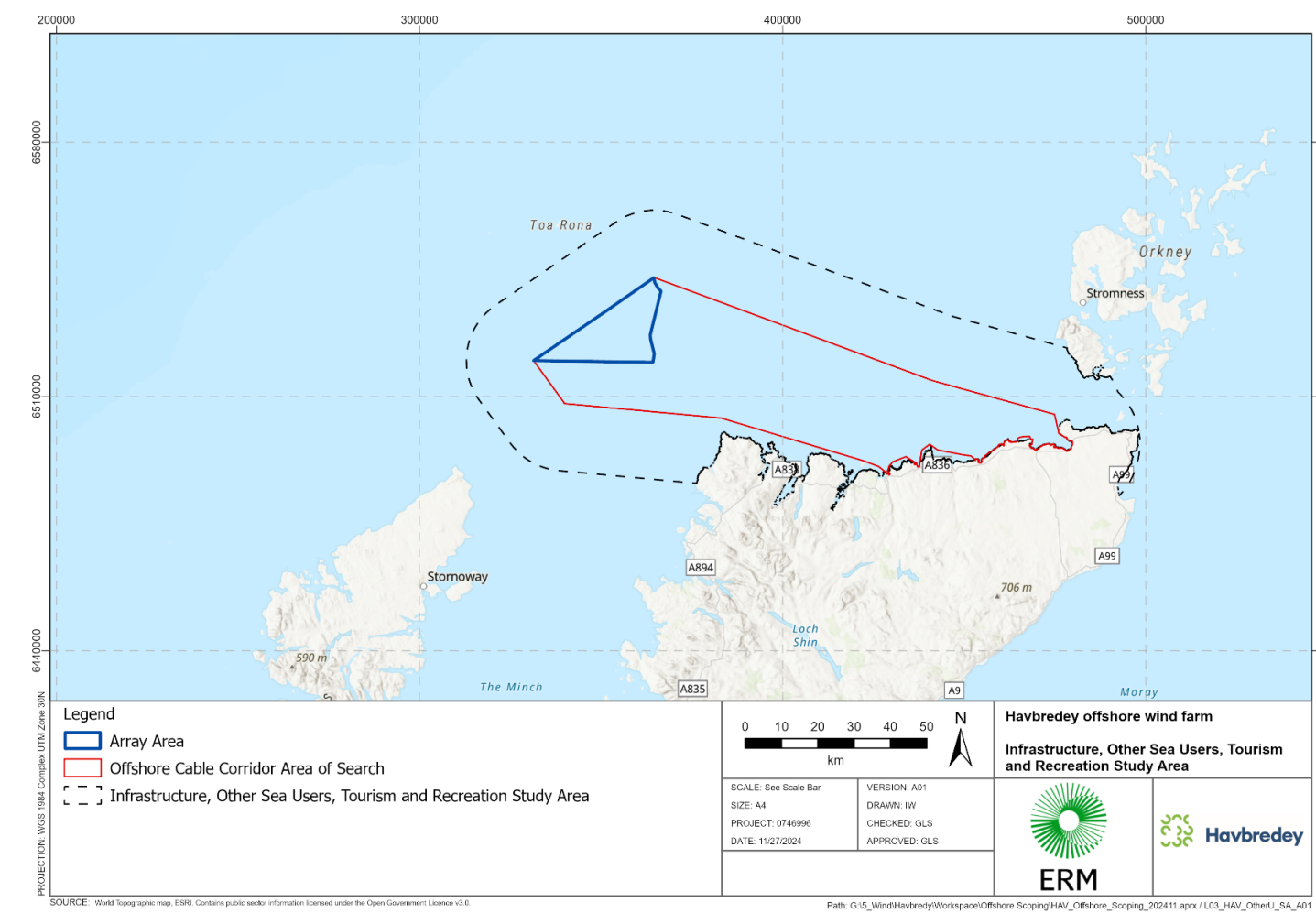



Figure 6.13-1 Infrastructure, Other Sea Users, Tourism and Recreation Study Area

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6.13.3. BASELINE ENVIRONMENT

6.13.3.1.Data Sources

Data sources used to inform this Infrastructure, Other Sea Users, Tourism and Recreation Chapter of the Offshore Scoping Report are presented in Table 6.13-1.

Table 6.13-1 Summary of Key Data Sources for Infrastructure, Other Sea Users, Tourism and Recreation

Source	Spatial Coverage	Year	Summary
Scotland's National Marine Plan (NMP)	Scotland	2015	Scotland NMP, which includes mapped aquaculture, fisheries, subsea cables, CCS, offshore renewables, aggregates and oil and gas in Scottish waters
CES	Scotland	2024	CES asset maps for energy, aquaculture, infrastructure, ScotWind and Innovation Targeted Oil and Gas (INTOG) offers
NMP Interactive maps	Scotland	2024	MD interactive map data portal, including renewable energy projects, cables and pipelines, oil and gas, and aggregates spatial data layers
NSTA Offshore Map	UK and North Sea	2024	NSTA interactive map for oil and gas infrastructure, pipelines and CCS
Scottish Marine Recreation and Tourism Survey Scottish coast 2015 Scottish marine recreation and tourism survey for 23 different activities	Scotland	2015	Scottish marine recreation and tourism survey for 23 different activities
RYA UK Coastal Atlas of Recreational Boating	UK	2004-2019	RYA GIS spatial dataset of recreational boating activities, including intensity indicators and locations of clubs, training centres, and marinas
Kingfisher Information Service - Offshore Renewable Cable Awareness (KIS-ORCA) interactive map	UK and Europe	2024	KIS-ORCA telecommunications and subsea power cable interactive map
Pentland FLOW EIAR	Partial coverage of Infrastructure,	2022	Description of Infrastructure, Other Sea Users, Tourism and Recreation baseline

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Source	Spatial Coverage	Year	Summary
	Other Sea Users, Tourism and Recreation Study Area		environment and receptors within the Pentland FLOW array area and export cable corridor
West of Orkney Windfarm Offshore EIAR	Partial coverage of Infrastructure, Other Sea Users, Tourism and Recreation Study Area	2023	Description of Infrastructure, Other Sea Users, Tourism and Recreation baseline environment and receptors within the West of Orkney Windfarm array area and export cable corridor

6.13.3.2. Overview of the Baseline Environment

To support this Offshore Scoping Report, an initial desk-based review of literature and available data sources (see Table 6.13-1) has been undertaken. The findings are presented below to provide an understanding of the baseline environment for Infrastructure, Other Sea Users, Tourism and Recreation.


Other Offshore Renewable Energy Projects

There are three other OWF located around the Offshore Project (see Figure 6.13-2) these include:

- Talisk OWF, approximately 20 km west of the Array Area and Offshore Cable Corridor Area of Search and outside the Infrastructure, Other Sea Users, Tourism and Recreation Study Area
- West of Orkney OWF, approximately 49 km east of the Array Area and overlapping the Offshore Cable Corridor Area of Search and Infrastructure, Other Sea Users, Tourism and Recreation Study Area
- Pentland FLOW, formally known as Dounreay Tri Floating Wind Demonstration project, approximately 85 km southeast of the Array Area and within the Offshore Cable Corridor Area of Search


The Talisk OWF is in the pre-planning stage with an expected generating capacity of 495 MW once fully operational. The developer, Magnora Offshore Wind, is aiming to achieve consent in 2027 and commence construction in 2030 for operation in 2031. The Offshore Project is not considered to interact with the Talisk OWF as it is outside of the Infrastructure, Other Sea Users, Tourism and Recreation Study Area.

The Offshore Project has the potential to interact with the West of Orkney OWF and Pentland FLOW on the north coast of mainland Scotland. The West of Orkney OWF submitted its Marine Licence application and Section 36 application in September 2023. It proposes up to five offshore export cables to two landfalls at Greeny Geo and/or Crosskirk at Caithness. It is estimated that construction of the West of Orkney OWF will commence at the end of 2028. Pentland FLOW was granted consent in June 2023, however, the construction period is currently unknown. Pentland FLOW's consents permit up to two offshore export

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cables for landfall at Dounreay between the boundary of the Vulcan Naval Reactor Test Establishment and the White Geos (adjacent to Sandside Bay). Pentland FLOW is expected to have a generating capacity of up to 100 MW once fully operational.

No tidal lease sites or wave lease sites have been identified within the Infrastructure, Other Sea Users, Tourism and Recreation Study Area or wider vicinity the Offshore Project. However, the Offshore Cable Corridor Area of Search intersects the North Sutherland Coast Scottish Marine Plan wave draft plan option area. This option area has been identified for potential future wave lease sites.

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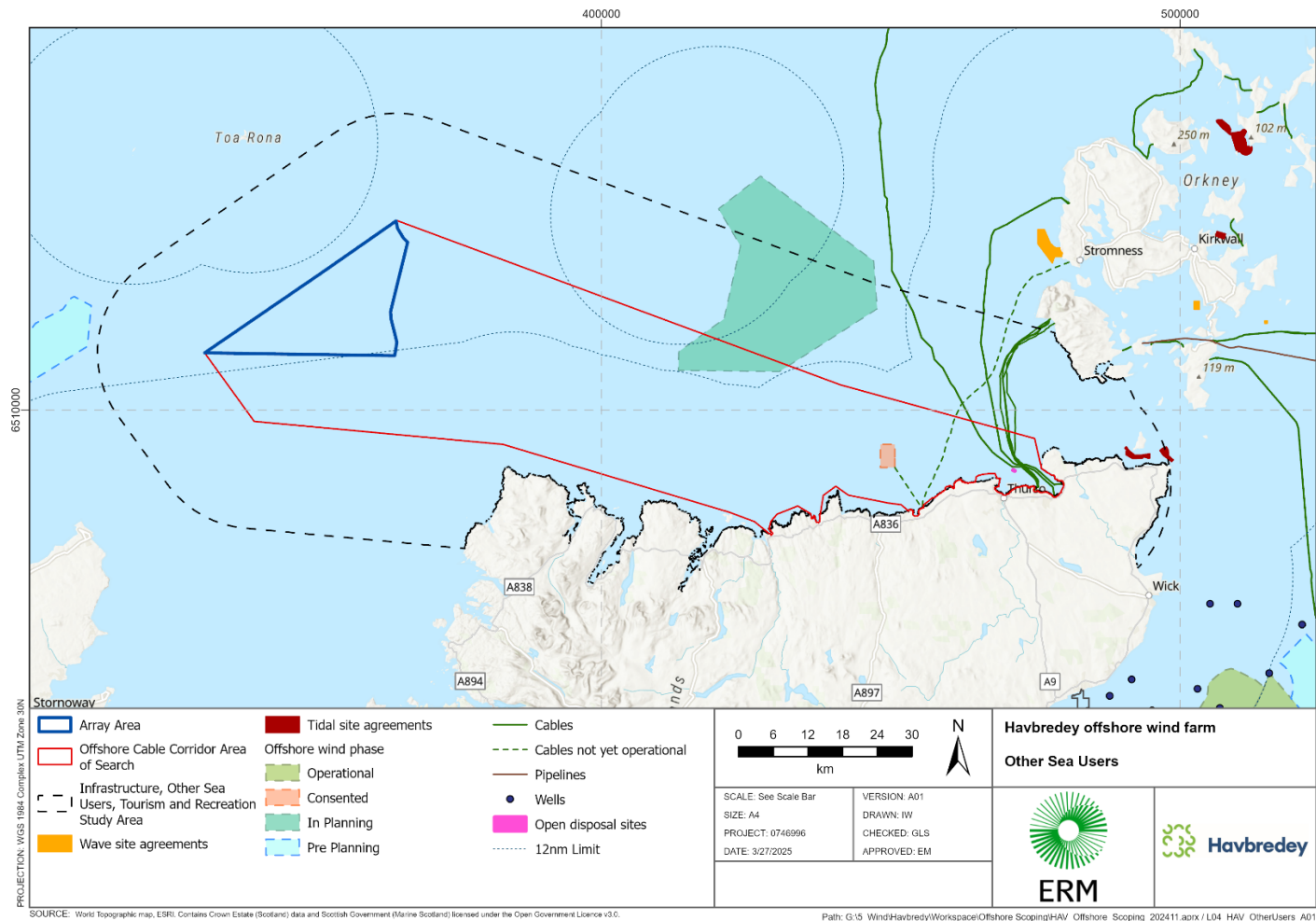



Figure 6.13-2 Overview of Infrastructure and Other Sea Users Present within the Study Area

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Military Practice and Exercise Areas

Military PEXA within the Infrastructure, Other Sea Users, Tourism and Recreation Study Area and Offshore Cable Corridor Area of Search are presented in Figure 6.13-3.

Seven military PEXA have been identified to intersect the Infrastructure, Other Sea Users, Tourism and Recreation Study Area:

- Two AIAA, D712A and D712B, intersect the southeast of the Array Area and the majority of the Offshore Cable Corridor Area of Search
- AIAA, D712C, intersects the southeast of the Offshore Cable Corridor Area of Search
- Two surface firing ranges and danger areas, Cape Wrath (North West), D801 and Cape Wrath (South East), D802, which intersect the Offshore Cable Corridor Area of Search
- Land-based firing range extending offshore at Garvie Island, D803, intersect the Offshore Cable Corridor Area of Search
- The Pulteney submarine PEXA, X5824, located south of the Array Area and overlaps the Infrastructure, Other Sea Users, Tourism and Recreation Study Area

Cape Wrath (North West), D801, is entirely offshore and is used for sea and air training activities and field fire. Cape Wrath (South East), D802, is partially land-based so as well as sea and air training activities it is also used for land-based field fire and dry training exercises. The Garvie Island PEXA is a land-based firing range which extends offshore and is used by the Royal Air Force for training activities using live weapons. These sites operated in accordance with a CRP where exercises and firing only take place when the area is considered to be clear of all vessels.

The Pulteney submarine PEXA, X5824 does not intersect the Offshore Project and is located south of the Array Area, overlapping the Infrastructure, Other Sea Users, Tourism and Recreation Study Area. This area is used for submarine exercises only, no surface firing is undertaken within this area and as such it is not labelled as a danger area.

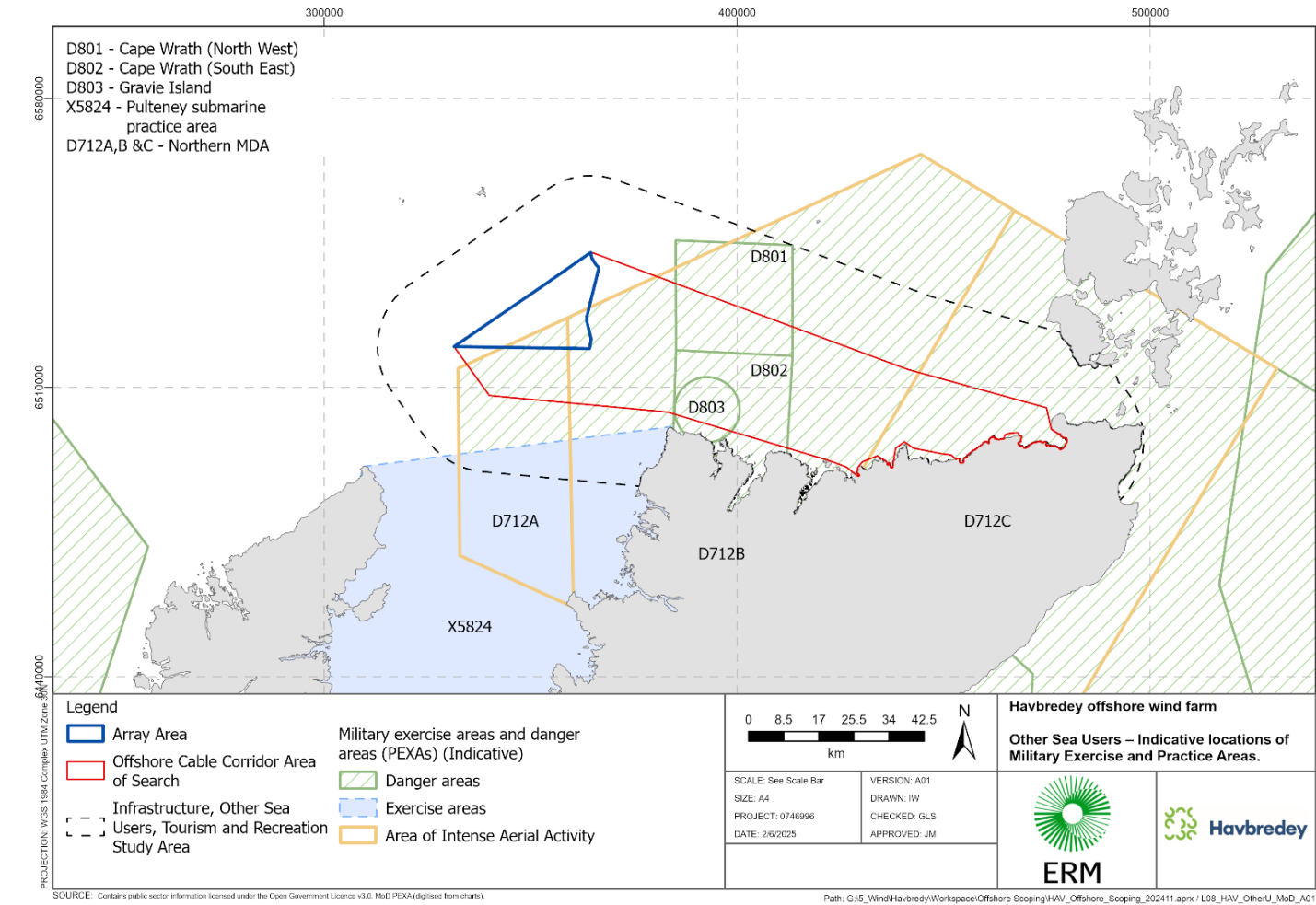



Figure 6.13-3 Military Practice and Exercise Areas

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Subsea Cables

Subsea cables relating to OWFs are discussed above. Six active subsea cables (including power and telecommunication cables) are identified to intersect the eastern part of the Infrastructure, Other Sea Users, Tourism and Recreation Study Area and Offshore Cable Corridor Area of Search, as show in Figure 6.13-2:

1. The active Farice telecommunication cable connecting Iceland and the Faeroe Islands to Castletown (Scotland)
2. The active Northern Lights telecommunication cable from Orkney to Dunnet
3. The active Pentland Firth power cable cluster from Orkney to Clardon, which comprises four subsea cables

In addition to the above, the Orkney Transmission Link power cable from Orkney to Caithness is currently undergoing construction and is expected to be completed in 2027 for commissioning in 2028.

Dredge Disposal Sites

In total, four dredge disposal sites are located within the Offshore Cable Corridor Area of Search. Three are located in Thurso Bay, two of which are closed (FI005 and FI010) and one is currently open (FI008). The fourth site is another closed dredge disposal site near Dounreay (FI002).

Recreation and Tourism

Overall marine tourism and recreation is observed at low levels throughout the coastal region of the Infrastructure, Other Sea Users, Tourism and Recreation Study Area (Figure 6.13-4).

Multiple coastal SCUBA diving sites are located within vicinity of the Landfall Area of Search, as well as coastal sea angling locations along the north coast of Scotland. High levels of surfing, kayaking, paddleboarding and canoeing are also observed along the north coast of Scotland including within the vicinity of the Landfall Area of Search. These activities are largely located within 10 km of the coastline and are most popular during the summer months.

Within 12 nm of the coastline, low levels of sailing are observed and several low use sailing routes are found to intersect the Array Area and Offshore Cable Corridor Area of Search. There is also one low-use motor boating route between the Outer Hebrides to Shetland Isles which intersects the Array Area in the southeast corner. Marine tourism and recreation activity data is unavailable for the portion of the Infrastructure, Other Sea Users, Tourism and Recreation Study Area located seaward of the 12 nm limit.

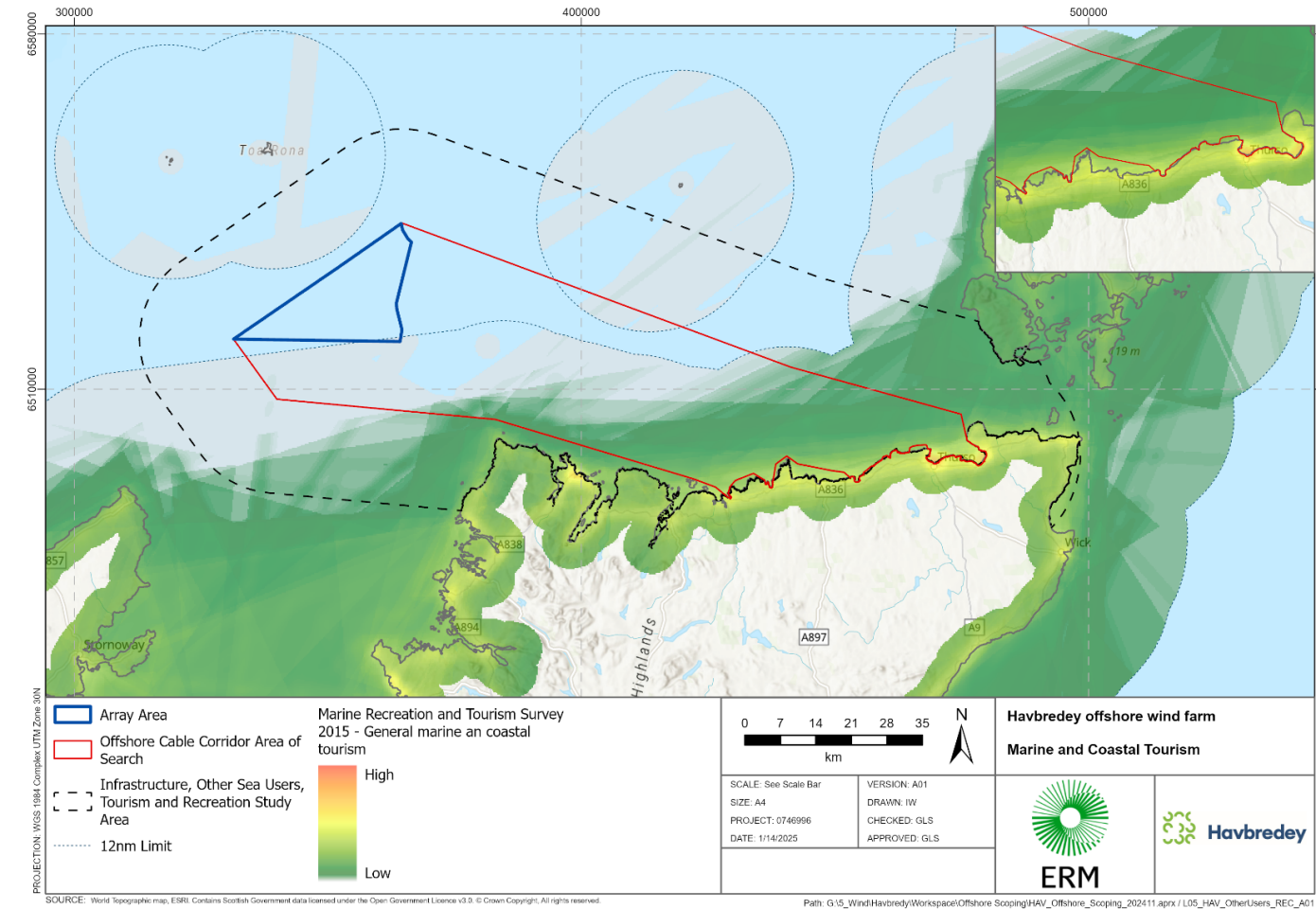



Figure 6.13-4 Recreation and Tourism Levels Inside 12 nm Within the Infrastructure, Other Sea Users, Tourism and Recreation Study Area (Marine Scotland, 2015b)

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Other Infrastructure

No pipelines, aggregate dredge sites, carbon capture storage sites, offshore wells, licenced or provisional oil and gas blocks have been identified within the Infrastructure, Other Sea Users, Tourism and Recreation Study Area (Figure 6.13-2). Several active aquaculture sites are located in the region; however, these are located within lochs and bays and are therefore not expected to interact with cable laying activities. No aquaculture sites are identified within the vicinity of the Landfall Area of Search.

6.13.3.3. Designed In Mitigation


The designed in mitigation relevant to the Infrastructure, Other Sea Users, Tourism and Recreation assessment, which have been incorporated into the current design of the Offshore Project, is outlined below in Table 6.13-2.

Table 6.13-2 Infrastructure, Other Sea Users, Tourism and Recreation Designed In Mitigation Measures

ID	Mitigation Description	How the Measure Will be Secured
ID018	Standard industry practice and protocols will be adhered to, including application for safety zones during construction, major maintenance activities and decommissioning, and implementation of advisory clearance distances from vessels working on the Offshore Project.	Secured under Section 36 and/or Marine Licence consent conditions & Application under Energy Act 2004.
ID030	Compliance of all Offshore Project vessels with international marine regulations as adopted by the Flag State, notably the International Regulations for Preventing Collisions at Sea (COLREGs) (IMO, 1974) and the SOLAS (IMO, 1974). All crew operating the vessels will have the required training and qualifications under national and international regulations.	Secured under Section 36 and/or Marine Licence consent conditions.
ID038	Timely promulgation of information via NtM, NtF and marking on nautical charts. Consultation with relevant stakeholders to raise awareness of the Offshore Project.	Secured under Section 36 and/or Marine Licence consent conditions.
ID039	As per the International Cable Protection Committee (ICPC) Recommendations, cable crossing and cable proximity agreements will be established with other developers/operators where necessary.	Cable crossing and cable proximity agreements.

6.13.4. SUMMARY OF KEY RECEPTORS, SENSITIVITIES AND LIKELY SIGNIFICANT EFFECTS

The key receptors for Infrastructure, Other Sea Users (noting fishing and navigation is covered elsewhere), Tourism and Recreation are:

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- Other OWFs
- Military PEXA
- Subsea cables
- Dredge disposal sites
- Recreation and tourism

6.13.4.1.Likely Significant Effects

The scoping of likely significant effects on Infrastructure, Other Sea Users, Tourism and Recreation receptors which may arise within the Infrastructure, Other Sea Users, Tourism and Recreation Study Area via the proposed Offshore Project, are outlined in Table 6.13-3.




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Table 6.13-3 EIA Scoping Assessment for Infrastructure, Other Sea Users, Tourism and Recreation

Potential Impact	Scoping Result	Justification	Assessment Method
Construction and Decommissioning			
Temporary loss of access or displacement of other sea users due to installation activities and vessels associated with the Offshore Project.	In	Other planned OWFs, recreation and tourism receptors, open dredge disposal site (FI008), the Orkney Transmission Link currently undergoing construction and military PEXA are identified within the Infrastructure, Other Sea Users, Tourism and Recreation Study Area which may be impacted by the construction and decommissioning of the Offshore Project.	Desk based assessment, based on publicly available data sources and consultation.
Temporary loss of access or displacement to active/operational subsea cable operations due to installation activities and vessels associated with the Offshore Project.	Out	Six active subsea cables have been identified within the Infrastructure, Other Sea Users, Tourism and Recreation Study Area. As these subsea cables are already operational it is assumed that there will be minimal vessel requirements to service these cables and as such are unlikely to be impacted by any temporary loss of access during construction.	N/A
Direct damage to infrastructure belonging to other developers/operators.	In	Possible interactions are identified within the Offshore Cable Corridor Area of Search with infrastructure planned for West of Orkney OWF, Pentland FLOW and the six identified active subsea cables and one subsea cable under construction.	Desk based assessment, based on publicly available data sources and consultation.

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Potential Impact	Scoping Result	Justification	Assessment Method
Increased turbidity as a result of construction activities smothering aquaculture resource areas.	Out	No aquaculture sites identified within the Infrastructure, Other Sea Users, Tourism and Recreation Study Area.	N/A
Operation and Maintenance			
Temporary/permanent loss of access or displacement of other sea users due to maintenance activities and vessels associated with the Offshore Project.	In	Other planned OWFs, recreation and tourism receptors, open dredge disposal site (FI008), the Orkney Transmission Link currently undergoing construction and military PEXA are identified within the Infrastructure, Other Sea Users, Tourism and Recreation Study Area which may be impacted by the operation and maintenance of the Offshore Project.	Desk based assessment, based on publicly available data sources and consultation.
Temporary loss of access or displacement to active/operational subsea cable operations due to installation activities and vessels associated with the Offshore Project.	Out	Six active subsea cables have been identified within the Infrastructure, Other Sea Users, Tourism and Recreation Study Area. As these subsea cables are already operational it is assumed that there will be minimal vessel requirements to service these cables. Vessel activity associated with the Offshore Project during operation is likely to be less than that of construction and as such other subsea cable operations are unlikely to be impacted by any temporary loss of access during operation.	N/A

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6.13.5. PROPOSED APPROACH TO EIA

6.13.5.1. Relevant Data Sources

Data sources listed within Table 6.13-1, alongside further secondary data sources including published and unpublished papers, journals and reports will be used to inform the EIA. These sources may be further supplemented by any additional material identified during stakeholder consultation.

No site-specific surveys are anticipated for Infrastructure, Other Sea Users, Tourism and Recreation.

6.13.5.2. Consultation

Consultation and engagement will be key to confirming the methodology and approach to the assessment. Throughout the duration of the Offshore Project, collaboration between the Offshore Project team and external stakeholders will be established. Organisations that will be consulted with respect to this specific EIA topic include, but are not limited to:

- MD-LOT
- MOD
- RYA Scotland
- NSTA
- Sport Scotland
- Local Stakeholders, such as boat tour operators and diving clubs
- Scottish Surfing Federation
- Surfers Against Sewage
- North Coast Watersports and other local surf and watersports clubs
- Scottish Canoe Association and local canoe clubs
- Federation of Sea Anglers and local sea angling clubs
- SEPA
- The Highland Council
- Bettyhill, Strathnaver and Altnaharra Community Council
- Strathy and Armadale Community Council
- Other infrastructure (OWF and seabed cable) owners

6.13.5.3. Policy, Legislation and Guidance

The assessment of Infrastructure, Other Sea Users, Tourism and Recreation will consider the legislation, policy and guidance listed below (Table 6.13-4).


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Table 6.13-4 Legislation, Policy and Guidance Relevant to the Infrastructure, Other Sea Users, Tourism and Recreation Assessment.


Relevant Legislation, Policy and Guidance
Legislation and Policy
Marine Scotland Act, 2010
Marine and Coastal Access Act, 2009
Environmental Assessment (Scotland) Act, 2009
Scotland's National Marine Plan, 2015
Sectoral Marine Plan (North)
Marine Strategy Framework Directive and Good Environmental Status
Scotland Economic Strategy (2022)
Highland wide Local development plan (in preparation) (2024)
Guidance
ICPC Recommendations (including those on cable crossing and cable proximity agreements) (ICPC, 2025)
European Subsea Cables Association (ESCA) guidelines on the proximity of offshore renewable energy installations and submarine cable infrastructure in UK waters (ESCA, 2016)
European Subsea Cables Association (ESCA) guidelines on notifications to vessels operating in close proximity to subsea assets (ESCA, 2020)
DECC guidance notes on applying for safety zones around offshore renewable energy installations (DECC, 2011)
The RYA's Position on Offshore Renewable Energy Developments: Paper 1 (of 4) – Wind Energy, June 2019 (RYA, 2019b)

6.13.5.4. Assessment Methodology

The assessment will follow the methodology described in Chapter 4: Proposed Approach of EIA. Further refinement of the methodology will be undertaken prior to the chapter being written as part of the baseline and stakeholder engagement. Cumulative and transboundary effects are also discussed in Chapter 4: Proposed Approach to EIA, and assessment of these will apply to Infrastructure, Other Sea Users, Tourism and Recreation.

The main aim of the Infrastructure, Other Sea Users, Tourism and Recreation assessment is to further understand and characterise the existing environment in the Infrastructure, Other Sea Users, Tourism and Recreation Study Area. A greater understanding of the key receptors identified, including other OWF developments, subsea cables, military PEXA and recreation and tourism receptors, will assist in providing a firm baseline for any potential effect of the Offshore Project.

Magnitude and duration of impact will be considered under the Infrastructure, Other Sea Users, Tourism and Recreation assessment, alongside the reversibility of the impact and the timing and frequency of the

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activity. An assessment of the likely significant effects of the Offshore Project will be undertaken through application of the evidence base.

Stakeholder consultation will be undertaken at pivotal points throughout the EIA process to ensure that the approach, including the application of the evidence base, satisfies the requirements of both stakeholders and regulators, such as after scoping, prior to commencement, and at the draft production of the chapter during the Offshore EIAR.

6.13.6. SCOPING QUESTIONS FOR CONSULTEES

Scoping questions for consultees in relation to the Infrastructure, Other Sea Users, Tourism and Recreation Assessment include:

1. Do you agree that the data sources referenced above to inform the baseline are valid for the purposes of this scoping assessment?
2. Have all Infrastructure, Other Sea Users, Tourism and Recreation receptors and potential impacts that could result from the Offshore Project been identified?
3. Do you agree with the assessment methodology proposed to be undertaken within the Offshore EIAR?
4. Do you agree that the designed in mitigation measures described provide a suitable means for managing and mitigating the relevant potential effects of the Offshore Project on Infrastructure, Other Sea Users, Tourism and Recreation receptors?

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6.14. SEASCAPE, LANDSCAPE AND VISUAL IMPACT ASSESSMENT

6.14.1. INTRODUCTION

This chapter of the Offshore Scoping Report provides an overview of the baseline environment for SLVIA within the Array Area and Offshore Cable Corridor Area of Search. It also includes a scoping assessment of likely significant effects for the relevant receptors, from the construction, operation (including maintenance), and decommissioning phases of the Offshore Project.

6.14.2. STUDY AREA


The SLVIA Study Area has been defined in accordance with good practice guidance, including the Landscape Institute's Guidelines for Landscape and Visual Impact Assessment (3rd Edition) (GLVIA3) and NatureScot's Visual Representation of Wind Farms Guidance (NatureScot, 2017). Current guidance prepared by NatureScot indicates that a study area for WTGs with a height in excess of 150 m to blade tip should extend to 45 km. This guidance predates changes in WTG technology since 2017 and the prevalence of WTGs in excess of 200 m in height which may be visible for greater distances but does recognise that greater distances may need to be considered for larger WTGs used offshore. In this regard, and in consideration of the proposed maximum blade tip height of up to 385 m (above MSL), a SLVIA Study Area extending to 60 km from the Array Area is proposed. The extent of this SLVIA Study Area is illustrated in Figure 6.14-1.

If required, RCS(s) will be located along the offshore export cable corridor. As the precise location(s) of RCS(s) are not yet known, these have been excluded from the SLVIA Study Area at the scoping stage. If the need for RCS(s) is confirmed as the Offshore Project design matures during the consenting process, it is proposed a 20 km buffer is applied to RCS location(s) and added to the SLVIA Study Area defined above for assessment within the EIA, as informed by NatureScot guidance (NatureScot, 2017). Data sources, visual receptors and representative viewpoints would be re-considered to account for the additional study area if required.

As the assessment of the Offshore Project is progressed, a desk-based examination of the predicted visibility of the WTGs and fieldwork will be undertaken in order to confirm the appropriateness of the SLVIA Study Area and the potential for a reduction proportionate to the likely extent of significant adverse effects on seascape, landscape and visual receptors.

Adopting a SLVIA Study Area extending to 60 km from the Array Area, the majority of the SLVIA Study Area covers an area of the Atlantic Ocean to the north of Scotland, including the northern portion of the Isle of Lewis and Landfall Area of Search across northwest Sutherland.

Within the SLVIA Study Area, the SLVIA will generally focus on locations from where it may be possible to see the Offshore Project, as defined by the Blade Tip Zone of Theoretical Visibility (ZTV). The indicative

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Blade Tip ZTV provided in Figure 6.14-1 indicates that theoretical visibility of the WTGs would occur across coastal and elevated Landfall Area of Search locations within 60 km and that beyond this distance, the geographic extent of visibility will become increasingly restricted.

At distances in excess of 60 km, the lateral (or horizontal) spread of the Offshore Project will occupy a limited portion of available views and the apparent height (or 'vertical angle') of the WTGs would also appear very small; therefore, significant visual effects are unlikely to arise at greater than this distance, even if the WTGs are visible. In considering the SLVIA Study Area, the sensitivity of the receiving seascape, landscape and visual receptors will be reviewed, taking into account the presence of designated landscapes and visual receptors.

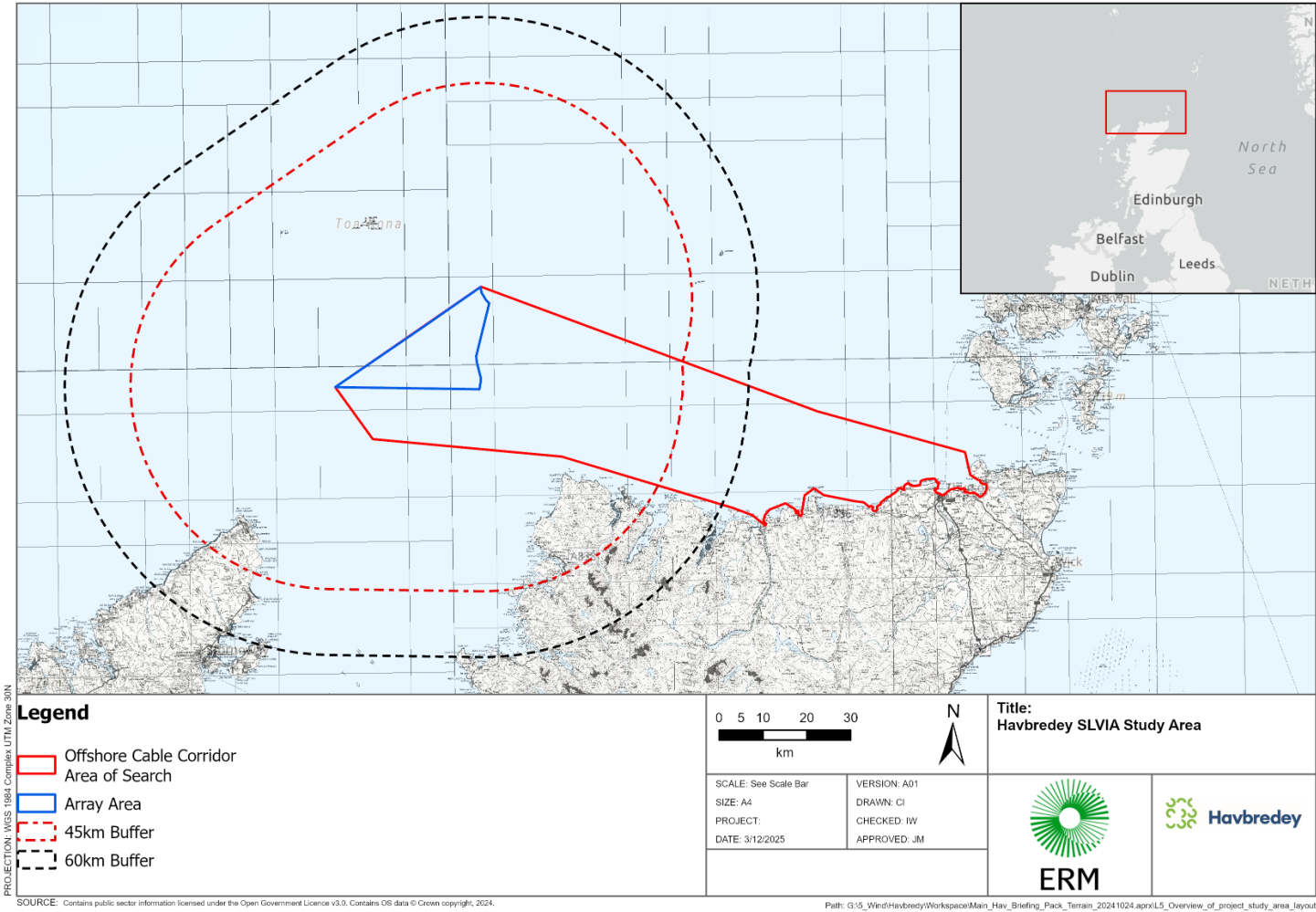



Figure 6.14-1 SLVIA Study Area

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6.14.3. BASELINE ENVIRONMENT

6.14.3.1.Data Sources

Data sources used to inform this SLVIA Chapter of the Offshore Scoping Report are presented in Table 6.14-1.

Table 6.14-1 Summary of Key Publicly Available Datasets for SLVIA


Source	Spatial Coverage	Year	Summary
Ordnance Survey (OS) 1:50,000 scale mapping	SLVIA Study Area	N/A	Mapping
Ordnance Survey County Region, Local Unitary Authority, Railways, Road and Settlements	SLVIA Study Area	N/A	Mapping
Ordnance Survey Terrain 50 Digital Terrain Model (DTM)	SLVIA Study Area	N/A	DTM
Ordnance Survey Terrain 5 DTM	SLVIA Study Area	N/A	DTM
Google Earth Pro	SLVIA Study Area	2022	Aerial Photography
National Coastal Character Types	SLVIA Study Area	2010	Mapping of coastal characterisation in Scotland
Scottish Landscape Character Types (LCTs) Map and Descriptions	SLVIA Study Area	2019	Mapping and descriptions of areas of consistent and recognisable landscape character within Scotland
National Scenic Areas - Scotland	SLVIA Study Area	2023	GIS dataset of National Scenic Areas
The Special Qualities of the National Scenic Areas. Scottish Natural Heritage Commissioned Report No.374 (iBids and Project no 648)	SLVIA Study Area	2010	Descriptions of the Special Qualities of the National Scenic Areas
Wild Land Areas (WLAs)	SLVIA Study Area	2020	GIS dataset of WLAs

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Source	Spatial Coverage	Year	Summary
Gardens and Designed Landscapes (GDLs)	SLVIA Study Area	N/A	Mapping of HES's Inventory of GDLs
National Trust for Scotland	SLVIA Study Area	N/A	Mapping of specific visitor attractions/tourist destinations
NatureScot, Outer Hebrides Core Paths Plan	The Western Isles	N/A	Mapping of core paths within the Western Isles
Sustrans, National Cycle Network	SLVIA Study Area	N/A	GIS dataset of signed on-road and traffic-free cycling routes across the UK
OceanWise, Marine and Coastal Mapping Data, Ferry Routes	SLVIA Study Area	N/A	GIS dataset of marine and coastal activity around the UK, including ferry routes
RYA, UK Coastal Atlas of Recreational Boating	SLVIA Study Area	2019	GIS dataset of recreational boating activity around the UK, including indicators of intensity of use and general boating areas
Pentland FLOW EIAR	Partial coverage of SLVIA Study Area	2022	SLVIA of the Pentland Offshore Wind Farm array area and export cable corridor
West of Orkney Windfarm Offshore EIA Report	Partial coverage of SLVIA Study Area	2023	SLVIA of the West of Orkney Windfarm array area and export cable corridor

6.14.3.2. Overview of the Baseline Environment

Supporting this Offshore Scoping Report, an initial desk-based review of literature and available data sources (see Table 6.14-1) has been undertaken; the findings are presented below, to provide an understanding of the baseline environment for SLVIA.

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Coastal Character

Rather than classifying seascape, NatureScot promotes the coastal character approach, which focuses on the coastal edge as a means of characterising marine landscapes. Thirteen National Coastal Character Types (NCCT) are identified in ‘An Assessment of the Sensitivity and Capacity of the Scottish Seascape in Relation to Offshore Windfarms’ (Scott *et al.* 2005), of which four occur within the SLVIA Study Area. These comprise:

- Type 1 – Remote High Cliffs
- Type 7 – Kyles and Sea Lochs
- Type 8 – Enclosed Bays, Islands and Headlands
- Type 13 – Low Rocky Island Coasts including sub types
 - 13a: Low Rocky Island Coasts with Dramatic Mountain Backdrop
 - 13b: Low Rocky Island Coasts with Distinctive Mainland/Island Views
 - 13c: Fragmented Low Rocky Island Coasts
 - 13d: Island, Sounds and Voes

Landscape Character

Published Landscape Character Assessments identify and describe the baseline character of the landscape within the SLVIA Study Area at the national and regional level. NatureScot’s landscape character map (NatureScot, 2019) and associated LCT descriptions will form the basis of the baseline landscape character description of the SLVIA Study Area and the assessment of the visual aspects of perceived change to landscape character resulting from the Offshore Project. The likely relevant NatureScot LCTs comprise:

- LCT 134 – Sweeping Moorland and Flows
- LCT 136 – Rocky Hills and Moorland
- LCT 137 – Cnocan – Caithness & Sutherland
- LCT 141 – High Cliffs and Sheltered Bays
- LCT317 – Gently Sloping Crofting
- LCT 321 – Machair
- LCT 322 – Boggy Moorland
- LCT 323 – Rocky Moorland – Outer Hebrides

The locations of these relative to the Array Area are shown on Figure 6.14-2.

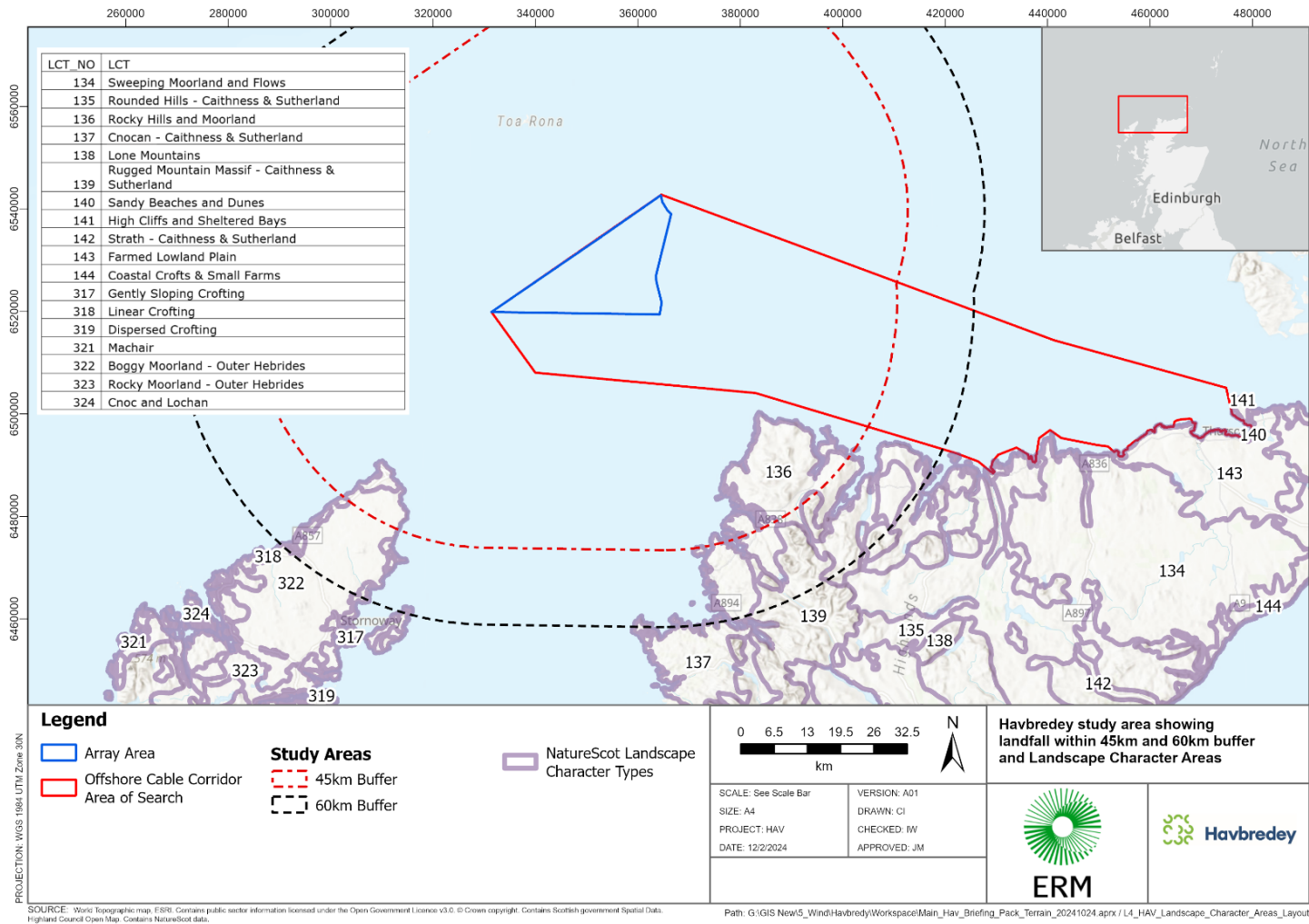



Figure 6.14-2 Landscape Character Areas Within the Vicinity of the SLVIA Study Area

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Landscape Planning Designations and Defined Wild Land Areas

There are no designations specifically to protect the character of the seascape, however, terrestrial areas within the SLVIA Study Area have been attributed as a landscape planning designation and some of these include areas of sea, close to the coast. These statutory and non-statutory designations include National Scenic Areas (NSA), Special Landscape Areas (SLA) (designated by The Highland Council), WLAs and GDLs, which are selected for inclusion in the Inventory of GDLs by HES¹⁸. Statutory and non-statutory designated landscapes falling within the SLVIA Study Area are shown on Figure 6.14-3 and Figure 6.14-4 and include:

- North West Sutherland NSA (approximately 41.0 km to the southeast of the boundary of the Array Area)
- Assynt-Coigach NSA (approximately 52.1 km south of the boundary of the Array Area)
- Kyle of Tongue NSA (approximately 56.3 km southeast of the boundary of the Array Area)
- Oldshoremore, Cape Wrath and Durness SLA (approximately 26.3 km southeast of the boundary of the Array Area)
- Eriboll East and Whiten Head SLA (approximately 49.3 km southeast of the boundary of the Array Area)
- WLA 34 – Reay – Cassley (approximately 49.3 km southeast of the boundary of the Array Area)
- WLA 37 – Foinaven Ben Hee (approximately 43.4 km southeast of the boundary of the Array Area)
- WLA 38 - Ben Hope - Ben Loyal (approximately 54.2 km southeast of the boundary of the Array Area)
- WLA 40 – Cape Wrath (approximately 27.2 km southeast of the boundary of the Array Area)

¹⁸ No GDLs are located within the SLVIA Study Area.

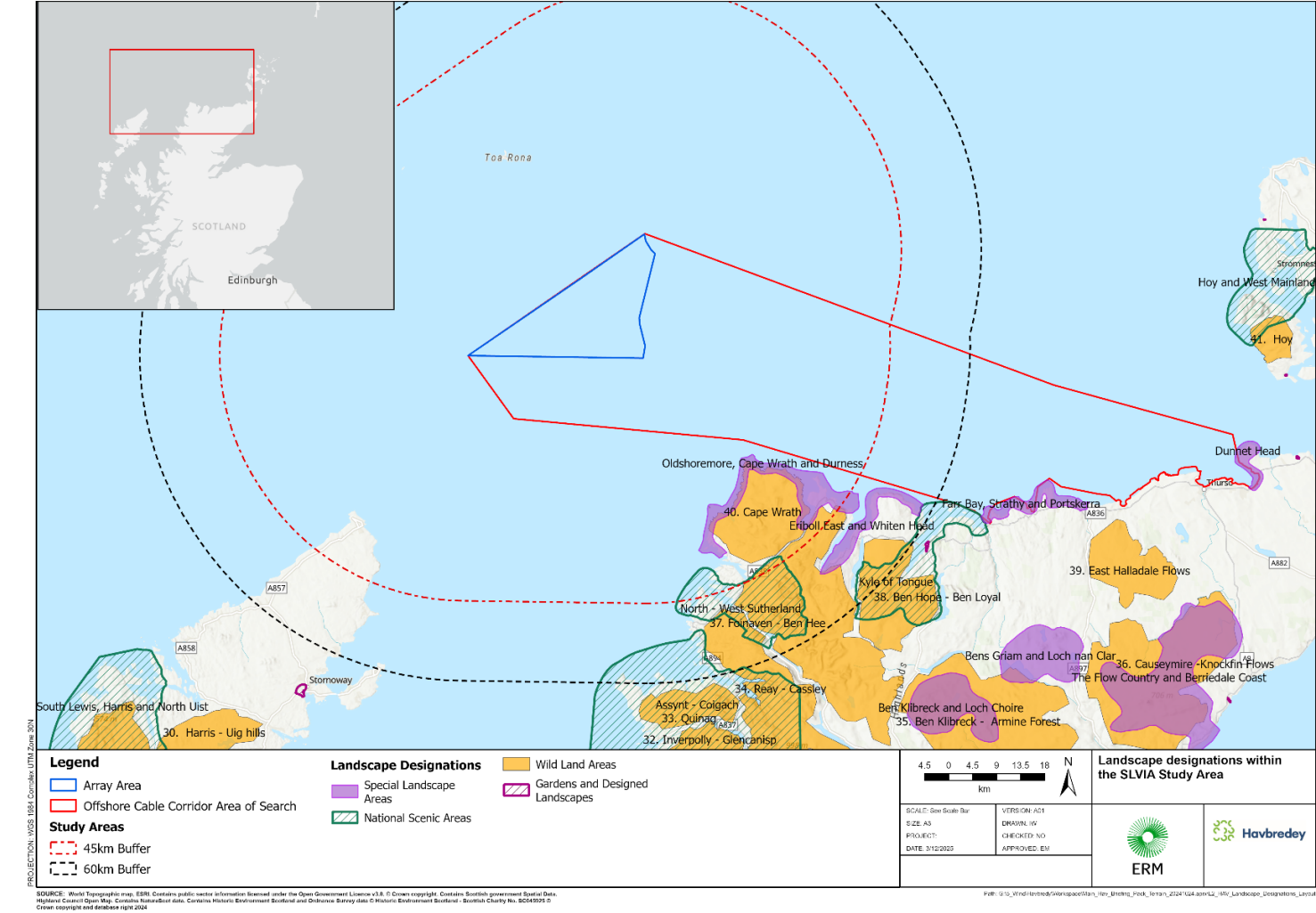


Figure 6.14-3 Landscape Designations Within the SLVIA Study Area

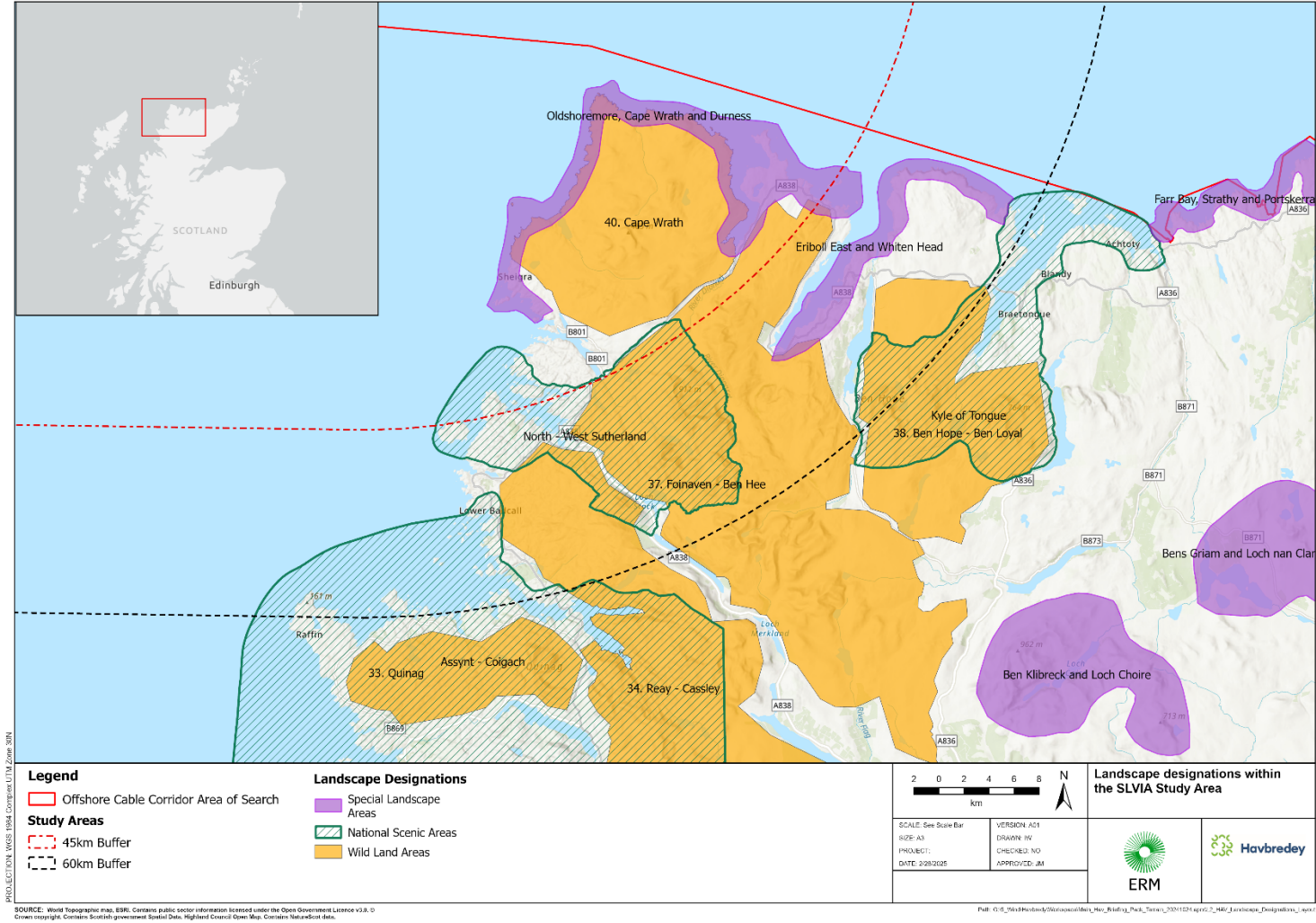



Figure 6.14-4 Landscape Designations Within the SLVIA Study Area (Focused Overlap of SLVIA Study Area and Landscape Designations)

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Visual Baseline

The visual baseline experienced from within the SLVIA Study Area ranges from complex and enclosed views of the sea from the northern part of Isle of Lewis, with a mix of enclosed and open, simple and expansive views of open sea from the northwest of Scotland and north coast of Scotland at Durness.

The north and northwest coastline of mainland Scotland within the SLVIA Study Area is very remote, with accessibility limited to walking for the majority. It is a complex coastline from Cape Wrath in the north down to Droman, being remote and wild. South of Droman the coastline is dominated by large headlands, lochs, rocky outcrops and many small islands.

The Isle of Lewis coastline within the SLVIA Study Area is generally rural in character, predominated by the linear patterns of crofting. There is a small settlement at the Port of Ness, with the rest of the coastline to the west being remote and largely unsettled.

Zone of Theoretical Visibility

The ZTV illustrates the main area across which the Offshore Project would be theoretically visible. The ZTV is used to inform the identification of different groups of people (visual receptors) who may experience views of the WTGs located within the Array Area. The ZTV is based on WTGs with a height of 385 m to blade tip (above MSL) alongside a WTG hub height of 220 m (above MSL) and represents a likely worst-case scenario for the SLVIA considered in the scoping assessment. The ZTV presents theoretical visibility of the WTG blade tips.

As illustrated by Figure 6.14-5, Figure 6.14-6 and Figure 6.14-7, the terrestrial areas of the SLVIA Study Area with theoretical visibility of the Offshore Project lie mainly towards the Atlantic coastline and comprise coastal areas of the Isle of Lewis and northwest Sutherland. High quality A1-sized versions of Figure 6.14-5, Figure 6.14-6 and Figure 6.14-7 are available in Appendix 3.

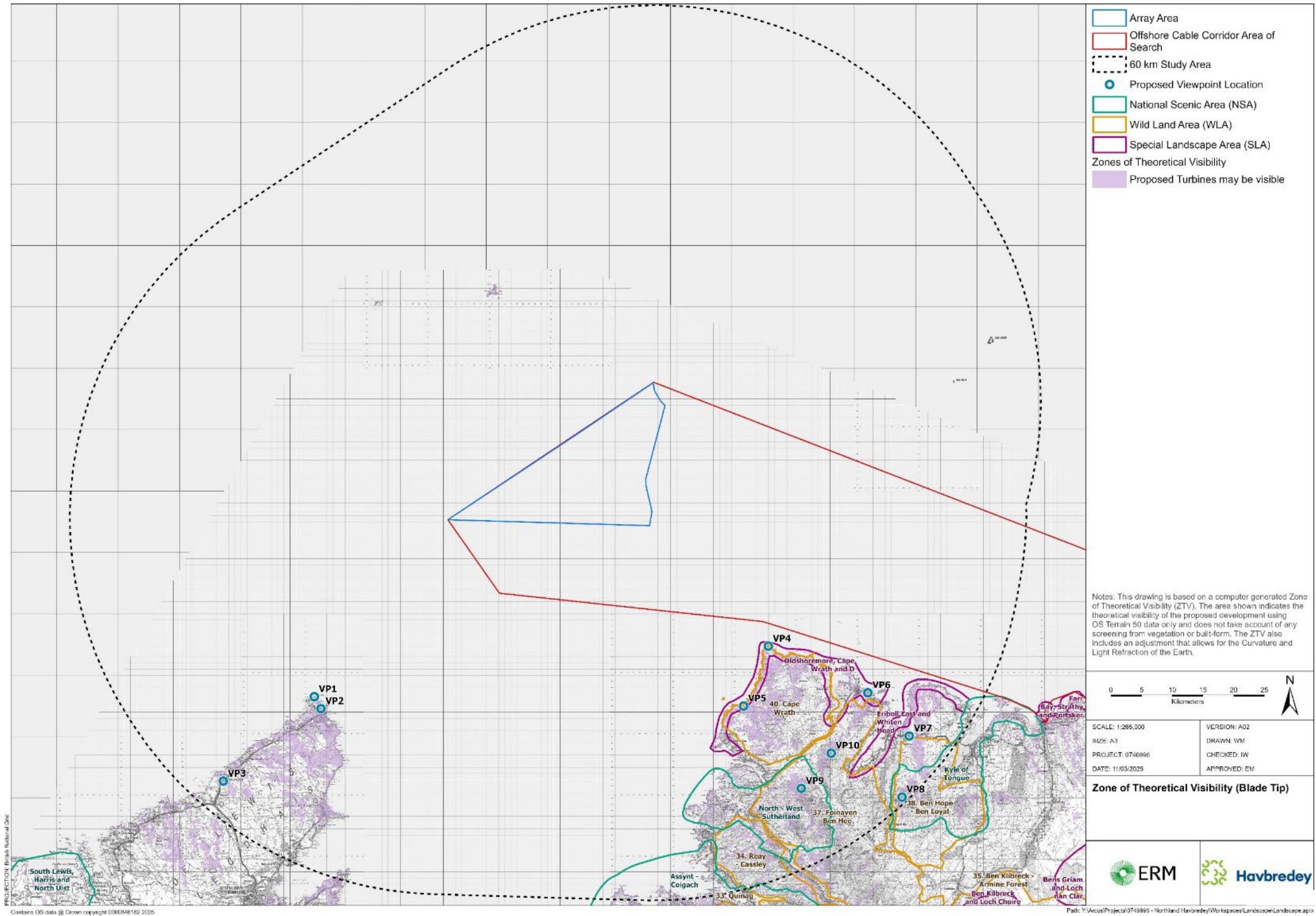


Figure 6.14-5 Zone of Theoretical Visibility (Blade Tip)

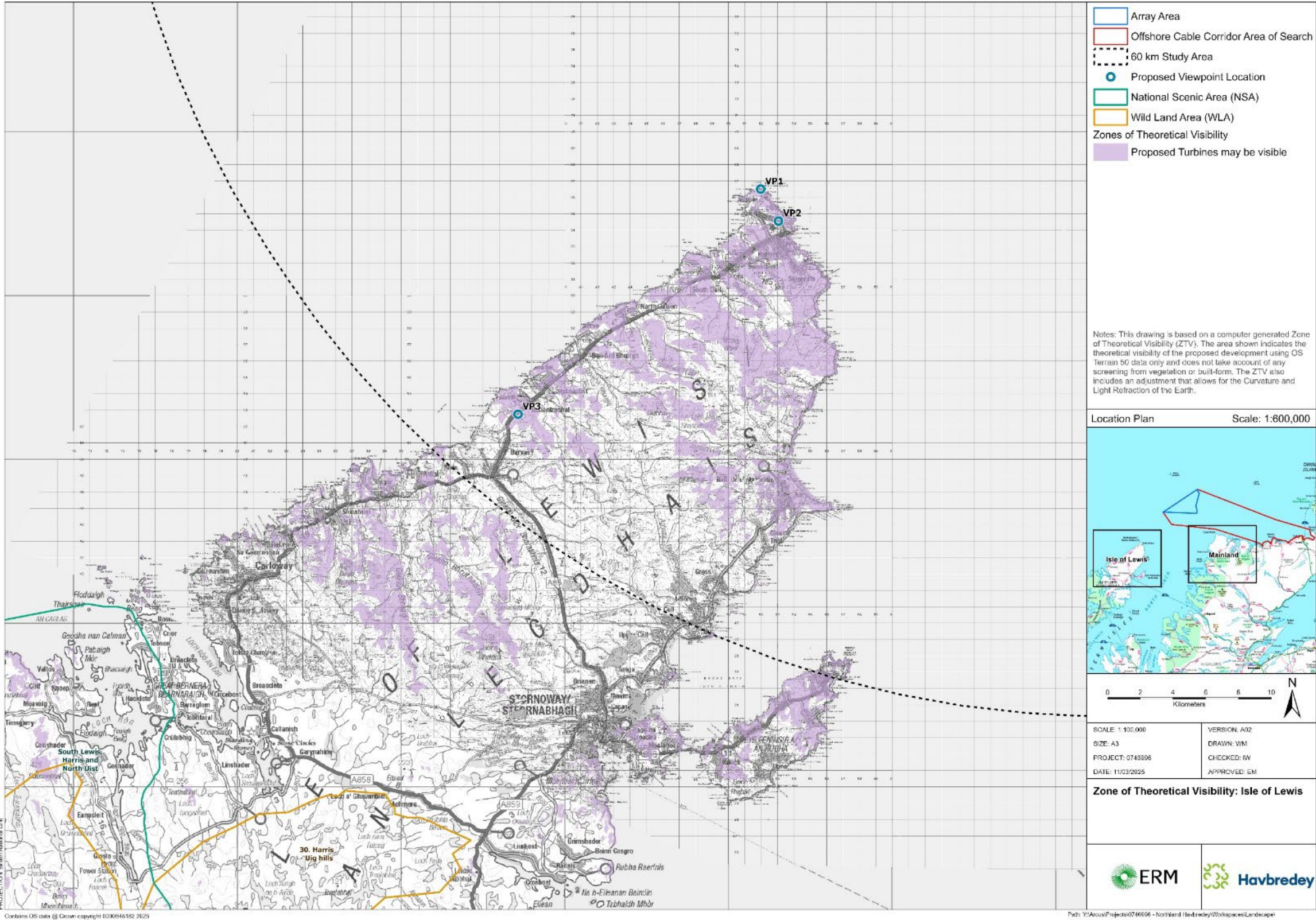


Figure 6.14-6 Zone of Theoretical Visibility: Isle of Lewis

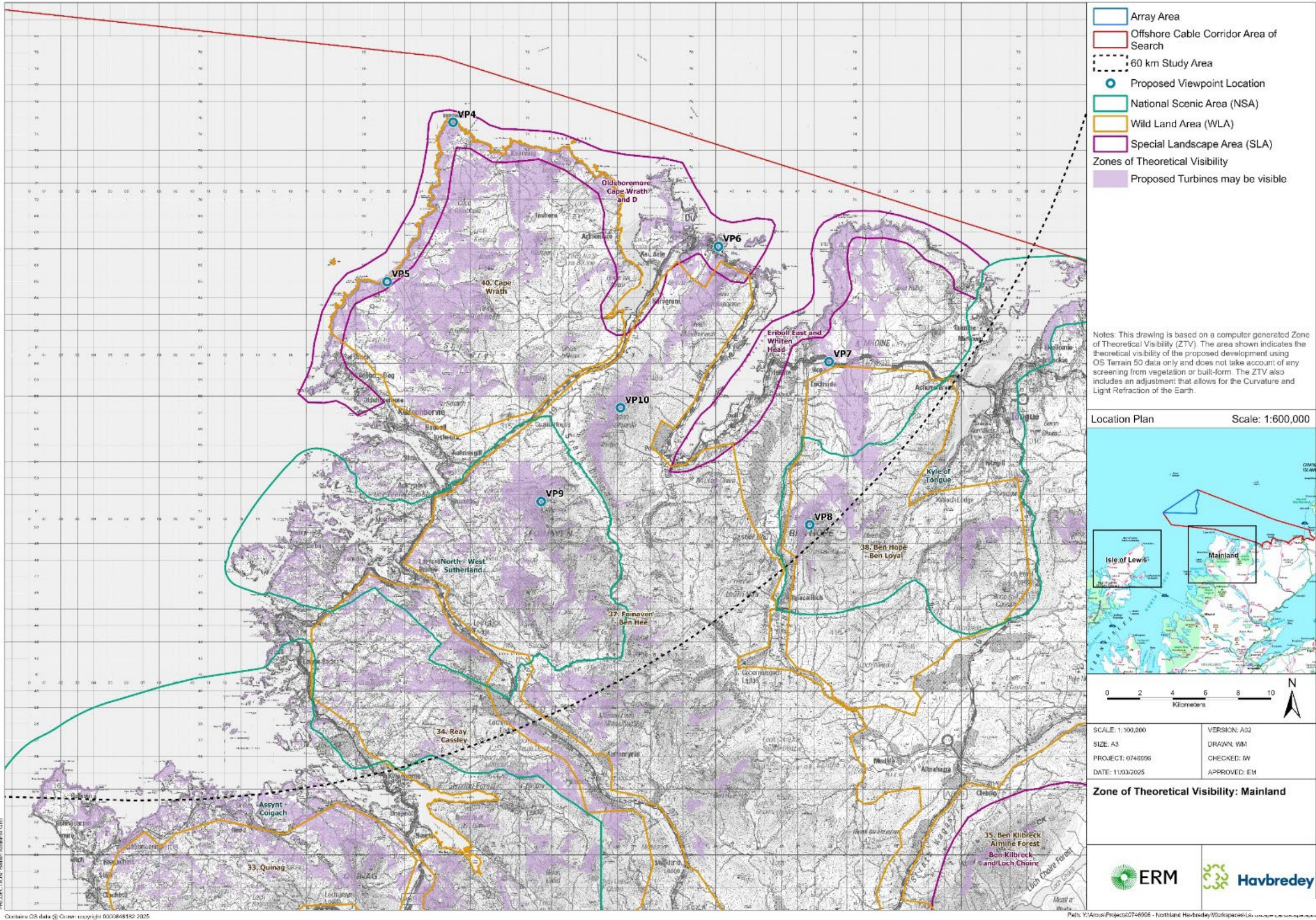



Figure 6.14-7 Zone of Theoretical Visibility: Mainland

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Visual Receptors

The principal visual receptors in the SLVIA Study Area are likely to be found along the section of coastline closest to the Offshore Project, the northern coast of Isle of Lewis between the Butt of Lewis and Cellar Head, along with the northwest coast of Scotland between Scourie and Cape Wrath and Cape Wrath to Durness. These include people within the crofting communities and other settlements; those visiting tourist facilities or historic environment assets; and/or those engaged in recreational activity, such as walking or cycling; as well as drivers on the roads.

An assessment will be undertaken in the SLVIA for those visual receptors that are most susceptible to visual changes arising from the Offshore Project and which may experience significant visual effects due to it. The assessment will focus on visual receptors at locations where the sea is a strong influence in the baseline view, along the northern coast of Isle of Lewis coastlines between the Butt of Lewis and Cellar Head and the northwest coast of Scotland between Scourie and Cape Wrath, and Cape Wrath and Durness. This may include:

- Port of Ness
- Durness
- Shegra
- Oldshoremore
- Shegra Peat Road Core Path
- Sandwood Bay Core Path
- Faraid Head Core Path

Representative Viewpoints

A proposed list of representative viewpoints is presented in Table 6.14-2, Figure 6.14-5, Figure 6.14-6 and Figure 6.14-7 based on the ZTV for the Offshore Project. The viewpoints represent locations within the SLVIA Study Area at which sensitive visual receptors have potential to be significantly affected. The selection of viewpoints considers the representation of different landscape and coastal character receptors within which they are located, and the surrounding context so that the visual assessment can inform the wider assessment. While the aim is to achieve a distribution of viewpoints from different directions and distances across the SLVIA Study Area, the priority is to ensure that the closer range or most sensitive receptors, with the greatest potential to be significantly affected, are fully represented. The viewpoint locations will be micro-sited during photography field work so that suitable locations are used that provide a clear representative view.

Representative Viewpoints 7-10 have been included based on feedback received during the scoping workshop.


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Table 6.14-2 Representative Viewpoint Locations

Viewpoint	Name	Grid reference (British National Grid)		Description
1	Butt of Lewis Lighthouse	151972	966499	Seascape/coastal character Landscape character Visitors
2	Knockaird, Isle of Lewis	153059	964548	Landscape character Residents
3	A857, Ballantrushal, Isle of Lewis	137151	952753	Landscape character Road users
4	Cape Wrath Lighthouse	225952	974724	Seascape/coastal character Oldshoremore, Cape Wrath and Durness SLA WLA 40 – Cape Wrath Landscape character Visitors
5	Sandwood Bay	221924	964986	Seascape/coastal character Landscape character Oldshoremore, Cape Wrath and Durness SLA WLA 40 – Cape Wrath Walkers
6	Durness	242167	967138	Seascape/coastal character Landscape character Oldshoremore, Cape Wrath and Durness SLA Residents/Visitors/Users of the North Coast 500
7	A838 (Moine Peninsula)	248920	960103	Landscape character Users of the A838 (North Coast 500)
8	Ben Hope	247747	950151	Landscape Character Kyle of Tongue NSA WLA 38 - Ben Hope - Ben Loyal

Viewpoint	Name	Grid reference (British National Grid)		Description
				Hill walkers
9	Fionaven (Ceann Garbh)	231335	951571	Landscape Character North - West Sutherland NSA WLA 37 - Foinaven - Ben Hee Hill walkers
10	Beinn Spionnaidh	236188	957297	Landscape Character WLA 37 - Foinaven - Ben Hee Hill walkers

Additional viewpoints within the SLVIA Study Area may be considered at the EIA stage following further consultation. Likewise, viewpoints beyond the SLVIA Study Area, as well as those identified through consultation as being of particular interest to the public or stakeholders, could also be included in the assessment where relevant.

6.14.4. DESIGNED IN MITIGATION

No designed in mitigation relevant to the SLVIA has been incorporated into the Offshore Project at this stage.

6.14.5. SUMMARY OF KEY RECEPTORS, SENSITIVITIES AND LIKELY SIGNIFICANT EFFECTS

6.14.5.1.Likely Significant Effects

The scoping of likely significant effects on SLVIA receptors which may arise within the SLVIA Study Area via the proposed Offshore Project, is outlined in Table 6.14-3.




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Table 6.14-3 EIA Scoping Assessment for SLVIA


Potential Impact	Scoping Result	Justification	Assessment Method
Construction and Decommissioning			
Impact (daytime and nighttime) of the construction and decommissioning of the Offshore Project on coastal character.	In	Potential for short term, temporary impacts on perceived seascape/coastal character, arising from visibility of construction and decommissioning activities and structures related to the Offshore Project, which may alter the coastal character. However, it is proposed that landscape and visual effects upon the Island of Northern Rona is scoped out as the island is uninhabited.	Assessed according to SLVIA methodology with reference to defined NCCTs and informed by the ZTV and visual assessment of representative viewpoints. Includes assessment of effects resulting from maritime and aviation lighting. The scope to the assessment of effects resulting from lighting (including viewpoints to be assessed) will be discussed with relevant stakeholders following confirmation of the maritime and aviation lighting strategy being proposed.
Impact (daytime and nighttime) of the construction, and decommissioning of the Offshore Project on perceived landscape character.	In	Potential for short-term, temporary impacts on perceived landscape character, arising as a result of the construction and decommissioning activities, activities which may be visible from the coast and may therefore affect the perceived character of the landscape. However, it is proposed that landscape and visual effects upon the Island of Northern Rona is scoped out as the island is uninhabited.	Assessed according to SLVIA methodology with reference to LCTs and informed by the ZTV and visual assessment of representative viewpoints. Includes assessment of effects resulting from maritime and aviation lighting. The scope to the assessment of effects resulting from lighting (including viewpoints to be assessed) will be discussed with relevant stakeholders following

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Potential Impact	Scoping Result	Justification	Assessment Method
			confirmation of the maritime and aviation lighting strategy being proposed.
Impact (daytime and nighttime) of the construction and decommissioning of the Offshore Project on perceived landscape character/special qualities of designated landscapes.	In	Potential for short-term, temporary impacts on perceived landscape character and special qualities of designated landscapes, arising because of the construction and decommissioning activities and structures within the Offshore Project, which may be visible from the coast and may therefore affect the perceived character and qualities of the landscape. However, it is proposed that landscape and visual effects upon the Island of Northern Rona is scoped out as the island is uninhabited.	<p>Assessed according to SLVIA methodology with reference to designated landscapes and informed by the ZTV and visual assessment of representative viewpoints.</p> <p>Includes assessment of effects resulting from maritime and aviation lighting. The scope to the assessment of effects resulting from lighting (including viewpoints to be assessed) will be discussed with relevant stakeholders following confirmation of the maritime and aviation lighting strategy being proposed.</p>
Impact (daytime and nighttime) of the construction and decommissioning of the Offshore Project on visual receptors/views.	In	Potential for short-term, temporary impacts on views and visual amenity experienced by people from principal visual receptors and representative viewpoints, arising because of the construction and decommissioning activities and structures, which may be visible from the coast and may therefore affect views and visual amenity.	Assessed according to SLVIA methodology and informed by the ZTV and visual assessment of representative viewpoints.

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Potential Impact	Scoping Result	Justification	Assessment Method
The seascape, landscape, and visual impacts of the construction and decommissioning of the offshore cables.	Out	Construction and decommissioning of the offshore export cables will require vessels, this will be a temporary occurrence and would not give rise to significant effects.	N/A
Impact of the construction and decommissioning of the Offshore Project outside the SLVIA Study Area.	Out	The SLVIA Study Area is defined to an outer limit within which significant effects could occur. Significant effects will not occur beyond the buffer applied (60 km around the Array Area) due to the limited changes to views arising from the offshore elements of the Offshore Project over such distances.	N/A
Impact of the construction and decommissioning of the Offshore Project on physical aspects of landscape character.	Out	No physical attributes that define landscape character or special qualities of designated landscapes will be changed because of the Offshore Project.	N/A
Operation and Maintenance			
Impact (daytime and nighttime) of the operation and maintenance of the Offshore Project on coastal character.	In	Potential for long-term, reversible impacts on perceived seascape/coastal character, arising from visibility of elements of the Offshore Project (WTGs and OSP(s) within the Array Area and RCSs along the offshore export cable corridor (if required), which may alter the coastal character.	Assessed according to SLVIA methodology with reference to defined NCCTs and informed by the ZTV and visual assessment of representative viewpoints.

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Potential Impact	Scoping Result	Justification	Assessment Method
		However, it is proposed landscape and visual effects upon the Island of Northern Rona is scoped out as the island is uninhabited.	Includes assessment of effects resulting from maritime and aviation lighting. The scope to the assessment of effects resulting from lighting (including viewpoints to be assessed) will be discussed with relevant stakeholders following confirmation of the maritime and aviation lighting strategy being proposed.
Impact (daytime and nighttime) of the operation and maintenance of the Offshore Project on perceived landscape character.	In	Potential for long-term, reversible impacts on perceived landscape character, arising as a result of the offshore structures (WTGs, OSP(s) and RCSs (if required)) and their maintenance which may be visible from the coast and may therefore affect the perceived character of the landscape. However, it is proposed landscape and visual effects upon the Island of Northern Rona is scoped out as the island is uninhabited.	Assessed according to SLVIA methodology with reference to LCTs and informed by the ZTV and visual assessment of representative viewpoints. Includes assessment of effects resulting from maritime and aviation lighting. The scope to the assessment of effects resulting from lighting (including viewpoints to be assessed) will be discussed with relevant stakeholders following confirmation of the maritime and aviation lighting strategy being proposed.
Impact (daytime and nighttime) of the operation and maintenance of the Offshore Project on perceived	In	Potential for long-term, reversible impacts on perceived landscape character and special qualities of designated landscapes, as a result of the offshore structures (WTGs, OSP(s) and RCSs (if	Assessed according to SLVIA methodology with reference to designated landscapes and informed by the ZTV and visual assessment of representative viewpoints.

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Potential Impact	Scoping Result	Justification	Assessment Method
landscape character/special qualities of designated landscapes.		required) and their maintenance, which may be visible from the coast and may therefore affect the perceived character and qualities of the landscape. However, it is proposed landscape and visual effects upon the Island of Northern Rona is scoped out as the island is uninhabited.	Includes assessment of effects resulting from maritime and aviation lighting. The scope to the assessment of effects resulting from lighting (including viewpoints to be assessed) will be discussed with relevant stakeholders following confirmation of the maritime and aviation lighting strategy being proposed.
Impact (daytime and nighttime) of the operation and maintenance of the Offshore Project on visual receptors/views.	In	Potential for long-term, reversible impacts on views and visual amenity experienced by people from principal visual receptors and representative viewpoints, arising because of the structures (WTGs and RCSs (if required)), which may be visible from the coast and may therefore affect views and visual amenity. However, it is proposed landscape and visual effects upon the Island of Northern Rona is scoped out as the island is uninhabited.	Assessed according to SLVIA methodology and informed by the ZTV and visual assessment of representative viewpoints. Includes assessment of effects resulting from maritime and aviation lighting. The scope to the assessment of effects resulting from lighting (including viewpoints to be assessed) will be discussed with relevant stakeholders following confirmation of the maritime and aviation lighting strategy being proposed.
Operation and maintenance phase seascape, landscape, and visual impacts	Out	The SLVIA Study Area is defined to an outer limit within which significant effects could occur. Significant effects will not occur beyond the	N/A

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Potential Impact	Scoping Result	Justification	Assessment Method
of the Offshore Project outside the SLVIA Study Area.		buffer applied (60 km around the Array Area) due to the limited changes to views arising from the offshore elements of the Offshore Project over such distances. However, viewpoints of interest to the general public and stakeholders may be considered beyond the SLVIA Study Area where relevant based on further consultation.	
The seascape, landscape, and visual impacts of the operation of the offshore cables.	Out	The offshore export cables will be located below the sea surface. It will not be visible as part of the seascape once operational and will have no effect on seascape, landscape, and visual receptors during operation. Whilst there may be periodic maintenance of the under-sea cables that would require vessels, this would be a temporary and irregular occurrence and would not give rise to significant effects.	N/A

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6.14.6. PROPOSED APPROACH TO EIA

6.14.6.1. Relevant Data Sources

Data sources listed within Table 6.14-1, alongside further secondary data sources including published and unpublished papers, journals and reports will be used to inform the EIA. These sources may be further supplemented by any additional material identified during stakeholder consultation.

In addition to the data sources highlighted in Table 6.14-1, the following additional data sources will be used in the EIA:

- Fieldwork Surveys
 - Site notes
 - Verification of the ZTV
 - Viewpoint photography
- Scottish Government Light Detection and Ranging (LiDAR) Digital Surface model for onshore land (if available)
- OS 50m DTM for onshore land

Data from the fieldwork surveys will enable the SLVIA Study Area to be characterised for EIA purposes and will also inform the assessment.

6.14.6.2. Consultation

Consultation and engagement will be key to confirming the methodology and approach to the assessment. Throughout the duration of the Offshore Project, collaboration between the Offshore Project team and external stakeholders will be established. Organisations that will be consulted with respect to this specific EIA topic, include:


- NatureScot
- The Highland Council
- Comhairle nan Eilean Siar

6.14.6.3. Policy, Legislation and Guidance

The assessment of SLVIA will consider the legislation, policy and guidance listed below (Table 6.14-4).

Table 6.14-4 Legislation, Policy and Guidance Relevant to the SLVIA Assessment.

Relevant Legislation, Policy and Guidance
Legislation and Policy
Council of Europe, European Landscape Convention (2006)
NPF4
Sectoral Marine Plan (North)

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Relevant Legislation, Policy and Guidance
Guidance
Landscape Institute (2013) Guidelines for Landscape and Visual Impact Assessment, Third Edition
NatureScot (2024) Guidance on Aviation Lighting Impact Assessment
NatureScot (2017) Siting and Designing Wind Farms in the Landscape, Version 3
NatureScot (2017) Visual Representation of Wind Farms; Good practice Guidance, Version 2.2
NatureScot (2021) Assessing the Cumulative Landscape and Visual Impact of Onshore Wind Energy Developments
Landscape Institute (2019) Visual Representation of Development Proposals
The Highland Council (2016) Visualisations Standards for Wind Energy Developments


6.14.6.4. Assessment Methodology

The assessment will follow the methodology described in Chapter 4: Proposed Approach of EIA. Further refinement of the methodology will be undertaken prior to the chapter being written as part of the baseline and stakeholder engagement. Cumulative and transboundary effects are also discussed in Chapter 4: Proposed Approach to EIA, and assessment of these will apply to SLVIA.

The main aim of the SLVIA assessment is to further understand and characterise the existing environment in the SLVIA Study Area and identify where likely significant effects on seascape, landscape and visual receptors will arise. A greater understanding of the key receptors identified will assist in providing a firm baseline for any potential effect of the Offshore Project.

Magnitude and duration of impact will be considered under the SLVIA assessment, alongside the reversibility of the impact and the timing and frequency of the activity. An assessment of the likely significant effects of the Offshore Project will be undertaken through application of the evidence base.


For SLVIA, there is potential for cumulative impacts of the Offshore Project with the onshore elements of the project on seascape, landscape and visual receptors, as well as cumulative impacts of the Offshore Project when considered together with other existing, under construction or consented stage developments. As described in Chapter 4: Proposed Approach to EIA, the CEA will consider impacts arising cumulatively with other relevant plans, projects and activities resulting in cumulative effects, rather than considering impacts from the Offshore Project alone, in line with the legal requirements of the relevant EIA Regulations. Other relevant plans, projects and activities considered in the CEA will be identified during the EIA process and will include permitted applications that are not yet implemented, submitted applications awaiting determination with design information in the public domain, and potentially include existing developments already built or in construction. These will include other nearby proposed OWFs as well as other types of plans and projects that could have a cumulative effect on landscape and visual receptors.

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The objective of the assessment of the Offshore Project will be to predict the significant effects on the coastal, landscape, and visual resource. In accordance with the relevant EIA Regulations, the SLVIA effects will be assessed to be either significant or not significant. The methodology to undertake the SLVIA will reflect the GLVIA3 (Landscape Institute, 2013). The SLVIA will assess the effects of changes resulting from the Offshore Project on seascape/landscape as a resource, the views available to people and their visual amenity. The SLVIA will be undertaken using the following steps:

- The elements of the Offshore Project that may result in coastal, landscape and visual effects will be considered; the overall scope of the assessment will include the SLVIA Study Area and the range of potential seascape, landscape, and visual effects
- The seascape/landscape baseline will be established using published coastal/landscape character assessments and informed by the ZTV of the Offshore Project. This will identify the likely seascape and landscape receptors that may be affected as well as any impacts upon the key features and the special characteristics of those features
- The visual baseline will be established by identifying the ZTV, identifying the receptors likely to be affected and selecting representative viewpoints
- A preliminary or ‘simple’ assessment will be undertaken of seascape, landscape and visual receptors using desk-based information, wirelines and ZTV analysis, to identify which coastal, landscape and visual receptors are unlikely to be significantly affected and scoped out of the assessment (in consultation with relevant stakeholders).
- The assessment will include the susceptibility of coastal, landscape and visual receptors to specific change and their value attached to landscape receptors and views, combining these judgements to determine the sensitivity of the landscape and visual receptors to the Offshore Project
- The assessment will include visualisations and figures based on NatureScot’s standards as set out in ‘Visual Representation of Wind farms: Version 2.2’ (NatureScot, 2017) in addition to The Highland Council’s Visualisations Standards for Wind Energy Developments (2016)
- An assessment of the geographical extent and scale of coastal/landscape impacts, the degree to which seascape/landscape elements are impacted including changes to visual amenity of the receptor and alteration to these key characteristics and/or special qualities of the landscape/designations will be undertaken, combining these judgements to assess the magnitude of change on each coastal/landscape receptor
- The assessments of sensitivity to change and magnitude of change will be combined to assess the significance of effect for seascape, landscape, and visual effects; if the assessment concludes significant effects, mitigation will be proposed where possible to reduce the effect significance

In accordance with GLVIA3 (Landscape Institute, 2013), the SLVIA methodology requires the application of professional judgement, but generally, the higher the sensitivity and the higher the magnitude of change the more likely that a significant effect will arise.

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Stakeholder consultation will be undertaken at pivotal points throughout the EIA process to ensure that the approach, including the application of the evidence base, satisfies the requirements of both stakeholders and regulators, such as after scoping, prior to commencement, and at the draft production of the chapter during the Offshore EIAR.

6.14.7. SCOPING QUESTIONS FOR CONSULTEES

Scoping questions for consultees in relation to the SLVIA include:

1. Do you agree that the data sources referenced above to inform the baseline are valid for the purposes of this scoping assessment? Are there any other data sources that should be included?
2. Do you agree that the assessment should focus on a 60 km Study Area around the Array Area and 20 km Study Area around the RCS (if required)?
3. Have all SLVIA receptors and potential significant effects that could result from the Offshore Project been identified?
4. Do you agree with the viewpoint locations proposed to be assessed within the Offshore EIAR?
5. Do you agree with the proposed approach to assessment (scoped in or out) for each of the potential significant effects in the EIA Scoping Assessment table for SLVIA?
6. Do you agree with the assessment methodology proposed to be undertaken within the Offshore EIAR?
7. Are there any sources of baseline coastal character information available for the SLVIA Study Area or are there local landscape designations or valued views in the SLVIA Study Area that have not been identified?
8. Do you agree with the proposed assessment methodology?

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6.15. CLIMATE

6.15.1. INTRODUCTION

This chapter of the Offshore Scoping Report provides an overview of the baseline environment for Climate within the Array Area and Offshore Cable Corridor Area of Search. It also includes an assessment of likely significant effects for the relevant receptors, from the construction, operation and maintenance (O&M), and decommissioning phases of the Offshore Project, and presents the proposed methodology for two distinct assessments related to climate that will make up the climate chapter of the EIA: a GHG assessment and a Climate Change Risk Assessment (CCRA).

Assessments will be undertaken in alignment with the IEMA guidance, 'Guide: Assessing GHG Emissions and Evaluating their Significance' (2022) and 'Environmental Assessment Guide to: Climate Change Resilience & Adaption' (2020). It will consider the likely significant effects of the Offshore Project on climate change through the GHG assessment, as well as the impacts of climate change to the Offshore Project via the CCRA. Due to the differences in these assessments, they will be addressed separately as part of this Offshore Scoping Report. Below is a summary of each of these assessments:


- GHG Assessment – this will include consideration of construction, O&M and decommissioning phase GHG emissions, following whole life carbon stages in line with PAS 2080 (Green Construction Board, 2023). It will detail mitigation measures to reduce GHG emissions through the entire lifecycle of the Offshore Project, and consider potential reductions on overall GHG emissions as a result of the renewable energy produced by the Offshore Project. Included within the GHG Assessment is a Blue Carbon Assessment, this reviews the potential loss of stored carbon within the marine environment as a result of disturbance and habitat loss from the Offshore Project.
- CCRA – this will include an assessment of physical climate-related risks which could impact the construction, O&M and decommissioning of the Offshore Project under present day and future projected climatic conditions. This assessment will also include the consideration of designed in measures and management plans (at a high level) which are anticipated to be included within the Offshore Project's design.

6.15.2. POLICY, LEGISLATION AND GUIDANCE

The assessment of Climate will consider the legislation, policy and guidance listed below (Table 6.15-1).

Table 6.15-1 Legislation, Policy and Guidance Relevant to the Climate Assessment

Relevant Legislation, Policy and Guidance
Legislation and Policy
The United Nations Framework Convention on Climate Change (UNFCCC) 1992
The Climate Change Act 2008
The Climate Change (Scotland) Act 2009
Climate Change Scotland: Scottish Climate Change Adaptation Programme 2024-2029

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Relevant Legislation, Policy and Guidance
The Climate Change (Duties of Public Bodies: Reporting Requirements) (Scotland) Amendment Order 2020
NPF, in particular NPF4
The Initial Plan Framework (IPF) outlines the process for development of the Sectoral Marine Plan for Innovation and Targeted Oil and Gas (INTOG)
Guidance
The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (WRI and World Business Council for Sustainable Development (WBCSD), 2015)
PAS 2080 Carbon Management in Infrastructure (Green Construction Board, 2023)
CCC UK Carbon Budgets
Climate Change Resilience and Adaptation (IEMA, 2020)
Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2022)

6.15.3. GHG ASSESSMENT

6.15.3.1. The GHG Study Area

Climate change impacts resulting from GHG emissions are a global concern. Consequently, no specific GHG Study Area has been delineated for this GHG assessment. As the assessment of climate is carried out in support of national and international targets for the reduction of GHG emissions, the GHG assessment will be conducted within the context of UK carbon budgets. This includes sources and removal of GHG emissions arising from the construction, O&M and decommissioning phases of the Offshore Project.

The Blue Carbon Assessment will consider the potential impacts of habitat loss of marine habitats (via the loss of stored carbon) that are within the Array Area and Offshore Cable Corridor Area of Search.


6.15.3.2. Baseline Environment

IEMA (2022) guidance states that the baseline for a GHG assessment can take the form of:

1. GHG emissions within the boundary of the GHG quantification but without the proposed project, or
2. GHG emissions arising from an alternative project design and/or business as usual for a project of this type

In the instance of the Offshore Project, GHG emissions within the boundary of the GHG quantification but without the proposed project will be difficult to quantify as the Offshore Project is located in an area with no physical development or activity, so therefore there would be no GHG emissions at site level.

The alternative baseline conditions for the GHG assessment will be calculated through a business-as-usual scenario whereby the Offshore Project does not proceed, and the equivalent energy generation capacity is

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provided via non-renewable sources. A baseline of a non-renewable energy source (combustion of natural gas using a combined cycle gas turbine to produce electricity) to produce the equivalent energy of the Offshore Project will be used as a comparison for GHG emissions. A baseline calculated from a non-renewable energy source is recommended due to the assumption that renewable energy sources (such as an OWF) are often used to replace existing non-renewable energy sources in line with government net-zero goals. This approach outlines the benefits of replacing non-renewable energy sources with renewable energy sources in the context of GHG emissions and climate change.

6.15.3.3. Designed in Mitigation


The designed in mitigation relevant to the Climate assessment, which has been incorporated into the current design of the Offshore Project, is outlined below in Table 6.15-2.

Table 6.15-2 Climate Designed In Mitigation Measures (GHG Assessment)

ID	Designed In Mitigation Measure	How the Measure Will Be Secured
GHG Assessment		
ID003	A CEMP and PEMP will be developed prior to construction and adhered to in compliance with legislative requirements and best practice standards and guidance.	Secured under Section 36 and/or Marine Licence consent conditions.
ID040	Measures to minimise lifecycle GHG emissions during construction from plant, equipment and construction materials will be outlined in the CEMP.	Secured under Section 36 and/or Marine Licence consent conditions.
ID041	Construction traffic emissions will be minimised through measures such as ensuring all vehicles switch off engines when stationary and consolidating deliveries where possible. Construction traffic management will be specified within the CEMP.	Secured under Section 36 and/or Marine Licence consent conditions.

6.15.3.4. Summary of Key Receptors, Sensitivities and Likely Significant Effects

The scoping of likely significant effects on GHG emissions have a cumulative impact on global warming as emissions produced have global effects regardless of where they occur. These emissions can alter the physical marine environment with respect to air temperature, sea surface and near bottom temperature, precipitation, winds, storms and waves, stratification, DO and salinity, ocean acidification, sea level rise and coastal erosion. Changes in the physical environment due to climate change can subsequently impact the biological environment through changes in habitats and predator-prey relationships, which in-turn has an effect on the human environment. Consequently, the cumulative effects of GHG emissions from individual

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projects should not be assessed in isolation, as there is no rationale for prioritising one project with GHG emissions over another.

No established thresholds exist for determining the significance of effects on climate within an EIA as a result of GHG emissions of different magnitudes. IEMA (2022) guidance states that:

"in the absence of any significance criteria or a defined threshold, it might be considered that all GHG emissions are significant, and an EIA should ensure the Project addresses their occurrence by taking mitigating action" and seek to contextualise GHG emissions, for example "against sectoral, local or national carbon budgets".

Effect significance will be determined based on the Offshore Project's whole life GHG emissions, as defined below:

- Major adverse: the Offshore Project's GHG impacts are not mitigated and do not make a meaningful contribution to Scotland's emissions reduction trajectory
- Moderate adverse: the Offshore Project's GHG impacts are partially mitigated, and the Offshore Project does not fully contribute to Scotland's emissions reduction trajectory
- Minor adverse: the Offshore Project's GHG impacts are fully consistent with existing and emergent policy requirements and good practice design standards, and is fully in line with Scotland's emissions reduction trajectory
- Negligible: the Offshore Project has negligible effects and provides GHG performance that is 'ahead of the curve' for Scotland's emissions reduction trajectory
- Beneficial: the Offshore Project's net GHG impacts are below zero and it causes a reduction in GHG concentration, whether directly or indirectly, compared to the 'without Offshore Project' baseline.
- Such a development substantially exceeds Scotland's emissions reduction trajectory requirements, with a positive climate impact

The Climate chapter of the EIA will assess the likely significant effects associated with the entire lifecycle of the Offshore Project regarding GHG emissions. The chapter will include a calculation of the emissions generated by the Offshore Project alongside the savings in emissions (relative to non-renewable resources) and the benefits resulting from its development. The primary objective of the Offshore Project is to contribute to the provision of secure, low carbon, and renewable electricity. Consequently, the implementation of the Offshore Project is expected to have a positive effect when evaluated against the current GHG emissions baseline.

The scoping of likely significant effects due to GHG emissions from the Offshore Project contributing to the impact of climate change are outlined in Table 6.15-3.




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Table 6.15-3 EIA Scoping Assessment for GHG Assessment

Potential Impact	Scoping Result	Justification	Assessment Method
Whole Offshore Project Lifecycle			
GHG emissions from vehicular and equipment use, and increased vessel movements, associated with undertaking surveys and investigation work (included within construction phase)	In	These activities have the potential to cause material impacts to the introduction of GHGs into the atmosphere.	Desktop assessment using GHG emissions assessments and Offshore Project information (e.g. design specifications, expected transport routes, predicted habitat loss).
GHG emission from manufacturing and transporting raw materials and components	In		
GHG emissions from vehicular and equipment use, and increased vessel movements, associated with construction activities	In		
Increased GHG emissions from vehicular and equipment use, and increased vessel movements, associated with operations and maintenance (replacement parts and associated deployment activities)	In		
Increased GHG emissions from vehicular and equipment use, and increased vessel movements, associated with decommissioning	In		

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Potential Impact	Scoping Result	Justification	Assessment Method
The temporary or permanent loss of Blue Carbon habitats, releasing stored carbon, into the atmosphere	In		

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6.15.3.5. GHG Assessment Methodology

The GHG assessment will be carried out following the latest best practices and industry standards. Relevant guidance documents, such as IEMA's guide to assessing GHG emissions (IEMA, 2022) and PAS 2080 (Green Construction Board, 2023) will be taken into consideration.

To assess the balance of GHG emissions from the baseline against the GHG impacts of delivering renewable energy throughout the Offshore Project's operation, the following will be assessed:


- GHG payback period: this considers the timeframe through which the Offshore Project must operate before it has returned an overall reduction in GHG emissions. This considers emission savings against the emissions produced from the overall Offshore Project, including construction, O&M and decommissioning phases, noting that the construction phase also encompasses pre-construction surveys and enabling works.
- Total emissions savings over the project lifespan: the expected GHG emissions savings as a result of energy generation from the Offshore Project replacing equivalent energy production from a non-renewable resource (combustion of gas) over the project lifetime will be assessed.

In order to deliver these assessments, the following will be considered:

- Identification of early mitigations available to reduce the quantity of GHGs emitted
- Development of baseline and identification of GHG concerns and key contributing sources, together with establishing the scope and methodology of the GHG assessment
- A GHG emissions assessment, including setting the scope and boundaries, the assessment methodology and the mitigation opportunities available
- Calculation of the GHG emissions inventory and evaluation of the significance of the emissions
- Reporting of findings and consideration of further mitigation opportunities

Further data to support the GHG assessment across the construction, O&M and decommissioning phases (where available) is summarised below:

- Construction:
 - Emissions associated with the extraction and manufacturing of required raw materials used for Offshore Project infrastructure components such as wind turbines generators (WTGs) and floating substructures
 - Emissions associated with vessel and vehicle activity on site, transport of materials to site and transport of waste from site, including via road vehicles and marine vessels
 - Emissions associated with significant equipment use during construction
- Operation and maintenance:
 - Emissions associated with operation of the wind farm

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- Emissions associated with maintenance and repair, such as the use of maintenance and serviced operation vessels
- Emissions associated with refurbishment and replacement, such as use of spare parts of infrastructure components, and associated vehicle and vessel activity
- Decommissioning:
 - Emissions associated with vessel and vehicle activity on site, transport of materials to site and transport of waste from site, including via road vehicles and marine vessels
 - Emissions associated with the deconstruction techniques used for the Offshore Project
 - Emissions associated with the disposal techniques of waste materials and Offshore Project components

Calculation Methodology

The calculation method used to quantify GHG emissions will be compatible with international standards. The calculation formula will have the following structure:

$$GHG \text{ Emission Factor} \times \text{Activity Data} = GHG \text{ emission or removal}$$

Emissions factors will be sourced from relevant databases and individual calculations for the various development activities and phases will be summed to form a GHG inventory for quantification as a whole.


Avoided Carbon

Different GHGs provide different levels of “warming-effects” within the earth’s atmosphere over a set time frame. Therefore, it can be challenging to compare different emissions impacts. In order to address this, GHG emissions are typically measured in CO₂ equivalents (expressed in weight) which provides a value for the 100-year warming effect of a given amount of GHG as an equivalent of CO₂.

A quantification will be carried out of the avoided carbon emissions as a result of the Offshore Project. Avoided emissions will be quantified by:

1. Estimating the energy generated by the operation of the Offshore Project
2. Estimating the volume of emissions generated by the combustion of natural gas to produce the quantity of energy equal to the operation of the Offshore Project
3. Applying appropriate emission factors to the volume of emissions calculated above

The carbon payback period for the Offshore Project will be calculated to determine the amount of time the carbon savings from the Offshore Project will take to outweigh the carbon emissions. Any caveats and assumptions included within these calculations will be listed within the EIA. The payback period is determined by dividing the total carbon cost (carbon losses) associated with the Offshore Project by the annual carbon gains achieved through displaced fossil fuel power generation. This metric provides insight

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into the efficiency of the Offshore Project in offsetting its carbon footprint and highlights the positive environmental impact it can achieve.

Blue Carbon

Blue Carbon is “carbon stored in coastal and marine ecosystems” (IUCN, 2017). Marine organisms store carbon through their biological processes, such as phytoplankton photosynthesising, and can occur as either organic material or as inorganic carbon in marine sediments. Several marine habitats in the UK are considered Blue Carbon habitats, such as kelp forests and salt marshes (Cefas, 2024). These habitats act as a carbon reserve that can be impacted by developments, where disturbance or loss can result in the release of GHGs.

Considerations of potential impacts to benthic habitats, including habitat loss and long-term disturbance of sediments, as detailed in Chapter 6.5: Benthic and Intertidal Ecology, will be undertaken and used to inform the Blue Carbon Assessment. This allows for any Blue Carbon habitats to be identified, and their potential to be impacted by the Offshore Project to be defined alongside the magnitude of those effects. Any potential loss of Blue Carbon habitats will result in a loss of stored carbon, that will then be incorporated into overall calculations of GHG emissions through the construction, O&M and decommissioning phases of the Offshore Project.

6.15.4. CCRA

6.15.4.1.The CCRA Study Area

The CCRA will focus on the assessment of physical climate related risks across the Offshore Project during the construction, O&M and decommissioning phases. The CCRA Study Area will include all aspects of the Offshore Project as shown on Figure 1-1, which includes the:


- Array Area
- Offshore Cable Corridor Area of Search

6.15.4.2. Baseline Environment

The baseline for the CCRA will be defined using historical climate data and meteorological records sourced from numerous international scientific organisations as detailed in below in Table 6.15-4.

Table 6.15-4 Data Sources Used to Inform the Baselines of the CCRA

Data Source	Summary of Data
Intergovernmental Panel on Climate Change (IPCC)	Global data on climate change impacts, adaptation and vulnerability
World Resources Institute (WRI)	Global data on climate trends and sustainability
International Best Track Archive for Climate Stewardship (IBTrACS)	Most complete global collection of tropical cyclone data

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Data Source	Summary of Data
Fathom	Global Flood Map providing a robust and comprehensive set of hazard data and flood risk information
National Aeronautics and Space Administration (NASA)	Global climate change data, including but not limited to global temperature trends, air quality, storms and hurricanes, and more
European Space Agency (ESA)	Global climate data, including but not limited aerosols, GHG, SST and salinity, ozone, sea level and more
Met Office UK Regional Climates (UKCP18)	Future national climate projections for land and marine regions as well as observed (past) climate data for the UK
World Bank	Climate Change Knowledge Portal which details international climate data and climate-risk information

Baseline data will be used to understand the current presence and intensity of a full list of climate hazards (covering a total of nine acute and chronic hazards) including extreme temperatures (hot & cold), flooding (river, extreme rainfall and coastal (including sea level rise)), extreme winds and storms, wildfires, and water stress and drought.

6.15.4.3. Designed in Mitigation


The designed in mitigation relevant to the climate assessment, which have been incorporated into the current design of the Offshore Project, are outlined below in Table 6.15-5.

Table 6.15-5 Climate Designed In Mitigation Measures (CCRA)

ID	Designed In Mitigation Measure	How the Measure Will Be Secured
CCRA		
ID042	An Emergency Management Plan (EMP) for the Offshore Project will be implemented which provides guidance for site personnel to follow. This will establish protocols in the case of extreme weather (high temperatures, extreme winds, extreme waves, flooding).	Secured under Section 36 and/or Marine Licence consent conditions.
ID043	The WTG design parameters should encompass a thorough evaluation of their resilience to extreme temperatures and high winds.	Incorporated into the Offshore Project design.

6.15.4.4. Summary of Key Receptors, Sensitivities and Potential Effects

The scoping of likely significant effects on climate related risks may manifest from physical changes to the climate and have the potential to emerge over a variety of time horizons, from short to long. Climate

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hazards have the potential to pose a wide range of impacts, such as damage to assets, disruption to operations (during the construction and O&M phase of the Offshore Project), risks to the health and safety of site personnel and, under extreme circumstances, cause reputational damage to the Applicant (if any of the previously noted impacts significantly hinder the Offshore Projects operations). Similarly, climate change is noted as having the potential to change the likelihood, intensity and materiality of the impacts posed by climate hazards to the Offshore Project.

Several key site aspects have been identified which could be impacted by physical risks and climate change. These receptors are summarised below:

- Project personnel
- Access routes and transportation
- Construction equipment
- WTGs and supporting infrastructure
- Local population & sea users

It is important to highlight that the Offshore Project will be designed to endure anticipated climate changes, ensuring resilience against severe storms, flooding and heatwaves. These designed in mitigation measures will be considered as part of the assessment of effects. Although the construction phase might encounter short-term extreme weather events like heatwaves and storm surges, the operational phase is likely to coincide with and face longer-term effects, encompassing extreme weather events and chronic climatic changes.

Scoping of likely significant effects on CCRA which may occur during the construction, O&M and decommissioning phases of the Offshore Project are outlined in Table 6.15-6.




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Table 6.15-6 EIA Scoping Assessment for CCRA

Potential Impact	Scoping Result	Justification	Assessment Method
Whole Offshore Project Lifecycle			
Risks to staff health and safety from short-term extreme weather events associated with climate change	In	These effects have the potential to cause material impacts to the Offshore Project.	Desktop assessment using baseline and projected climate data and Offshore Project information (e.g. design specifications, health and safety management plans).
Damage to assets (e.g. WTGs, substation platforms) as a result of short-term extreme weather events associated with climate change	In		
Business disruption (during both construction and O&M phase) as a result of short-term extreme weather events associated with climate change	In		
Reduced access to sites as a result of short-term extreme weather events associated with climate change	In		
Disruption in power supply to customers as a result of short-term extreme weather events associated with climate change	In		

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Potential Impact	Scoping Result	Justification	Assessment Method
Reputational damage to the Applicant as a result of health and safety issues, impacts to energy generation output and disruption to other businesses and the general public	In		

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6.15.4.5. CCRA Assessment Methodology

The CCRA will follow the climate change resilience and adaptation guidelines set out by IEMA (IEMA, 2020). Historical climate data and climate forecasts at both national and regional levels will be utilised to establish the current and future baseline. Potential climate risks and their impacts will be determined using the UKCP climate database, in conjunction with additional sector-specific resources and literature.

The sensitivity of receptors to potential impacts of climate change will be influenced by their susceptibility and vulnerability, which indicate their capacity to be affected by changes and their degree of exposure, respectively. The magnitude of a climate change impact will be evaluated by considering both the likelihood and the consequence of such an impact. Likelihood relates to the chance of the impact happening within a relevant timeframe, whereas consequence addresses the nature and severity of harm to the receptor in question (IEMA, 2020).

Due to the absence of established significance criteria for the CCRA, the determination of whether an effect is significant will rely on expert judgment and consideration of the project context (IEMA, 2020). A significance matrix consistent with the approach outlined in Chapter 4: Proposed Approach to EIA will be used to characterise this assessment.

A high-level vulnerability assessment of the activities and facilities associated with the construction and O&M phases of the Offshore Project will be undertaken. This will include:


- The evaluation of various physical climate hazards that may arise near the facilities associated with the Offshore Project
- An overview of the design strategies intended to be incorporated into the Offshore Project to mitigate the effects of physical climate-related risks

Step 1 – Summarise exposure:

The exposure of the Offshore Project to various climate-related hazards (such as floods, extreme heat events, and sea level rise) will be summarised. This will include mapping potential climate-related risks associated with the construction and O&M phases and will utilise the Offshore Project design information available at the time of writing.

Step 2 – Gather climate data:

Climate data will be sourced across the spatial areas associated with the Offshore Project (data will be collected and averaged across a series of coordinates covering the Offshore Project) and supplemented by any site-specific information. Desk-based data will be collected for 9 hazards (acute and chronic): extreme temperatures (hot & cold), flooding (river, extreme rainfall and coastal (including sea level rise)), extreme winds and storms, wildfires, and water stress and drought. Any trends observed in the projected climate

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data will be reviewed to assess the potential for a change in the presence and intensity of each climate hazard within the Offshore Project area for the project's lifetime.

Technical guidance on physical scenario analysis from the Task Force on Climate-Related Financial Disclosures (TCFD) and other sources recommend including a selection of scenarios covering a variety of reasonable climate outcomes. This includes a scenario representative of keeping global average temperatures at 2°C or lower, most closely aligned with the Paris Agreement, and the inclusion of higher emissions scenarios in order to determine the 'worst-case' (both standards identify Representative Concentration Pathway (RCP)-8.5, which has now been superseded by Shared Socioeconomic Pathway (SSP) 5-8.5 in the latest release of IPCC data). As a result, SSP1-2.6 and SSP5-8.5 will be used for this CCRA. See Table 6.15-7 for estimated temperature increases and definitions associated with each SSP.

Table 6.15-7 Proposed CCRA Climate Scenarios

Scenario	Definition	Mean annual temperature increase by 2100 compared to pre-industrial averages (1850)
SSP1-2.6	Envisions a central pathway where trends continue their historical patterns without substantial deviations.	+1.8°C (very likely range of 1.0°C-1.8°C)
SSP5-8.5	Consideration of a 'worst-case' scenario where challenges are high for mitigation (resource/fossil fuel intensive) and low for adaptation (rapid development).	+4.4°C (very likely range of 3.3°C-5.7°C)


Step 3 – Identify and assess potential risks:

Climate-related risks that could be present within the vicinity of the Offshore Project will be identified in accordance with the aforementioned industry best practices and guidelines. Additionally, where suitable, the assessment will identify any risks that may be intensified by climate change. This phase of the assessment will also take into account the planned measures aimed at strengthening the resilience of the Offshore Project's assets or mitigating the potential significant impacts of physical climate-related risks on the Offshore Project.

6.15.5. PROPOSED APPROACH TO EIA

6.15.5.1.Relevant Data Sources

Data sources listed within this chapter, alongside further secondary data sources including published and unpublished papers, journals and reports will be used to inform the EIA. These sources may be further supplemented by any additional material identified during stakeholder consultation.

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6.15.5.2. Consultation

Consultation and engagement will be key to confirm the methodology and approach to the assessment. Throughout the duration of the Offshore Project, collaboration between the Offshore Project team and external stakeholders will be established. Organisations that may be consulted with respect to this specific EIA topic, include:

- MD-LOT
- NatureScot

6.15.5.3. Assessment Methodology

The assessment will follow the methodologies described in Chapter 4: Proposed Approach of EIA and in Sections 6.15.3 and 6.15.4.5 of this chapter. Further refinement of the methodology will be undertaken prior to the chapter being written as part of the baseline and stakeholder engagement.

6.15.6. SCOPING QUESTIONS FOR CONSULTEES

Scoping questions for consultees in relation to GHG and CCRA include:

1. Do you agree that the data sources identified are sufficient to inform the baseline for the climate assessment?
2. Have all climate receptors and likely significant effects that could result from the Offshore Project been identified?
3. Do you agree with the assessment methodology proposed to be undertaken within the Offshore EIAR?
4. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts in the EIA Scoping Assessment tables relating to the GHG assessment and CCRA?

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6.16. SOCIO-ECONOMICS

6.16.1. INTRODUCTION

This chapter of the Offshore Scoping Report provides an overview of the baseline environment for socio-economics relevant to the Offshore Project. It also includes a scoping assessment of likely significant effects for the relevant receptors, from the construction, operation (including maintenance), and decommissioning phases of the Offshore Project.

6.16.2. STUDY AREA

The Socio-economics Study Area has been defined on the basis of the likely labour market to support the construction, operation and decommissioning of the Offshore Project. As such, the socio-economics area of study comprises the local authorities of Highlands, Na h-Eileanan Siar and the Orkney Islands, as shown in Figure 6.16-1 (the "Socio-economics Study Area"). These are the local authorities located closest to the Array Area and Offshore Cable Corridor Area of Search and therefore represent the likely local labour market for the Offshore Project, although the extent of local employment will depend to a large degree on the locations of the construction and assembly and operations and maintenance bases which have not been determined at this stage. Given the specialist nature of many of the skills that will be required it is also expected that a proportion of labour will be sourced from outside the Socio-economics Study Area, and so the assessment will also consider effects for Scotland and for the UK as a whole.

Within the Socio-economics Study Area, there may be the potential for effects to arise in particular epicentres where activity associated with the construction and operation of the Offshore Project is likely to be concentrated (for example around the construction and assembly and operations and maintenance bases). Should this be the case, small study areas will be defined during the assessment phase, when the locations of these bases have been determined and more detailed design information is available. It should be noted that topic-specific study areas will vary depending on the nature and scale of each receptor, or associated pathway, that could result in a receptor effect.

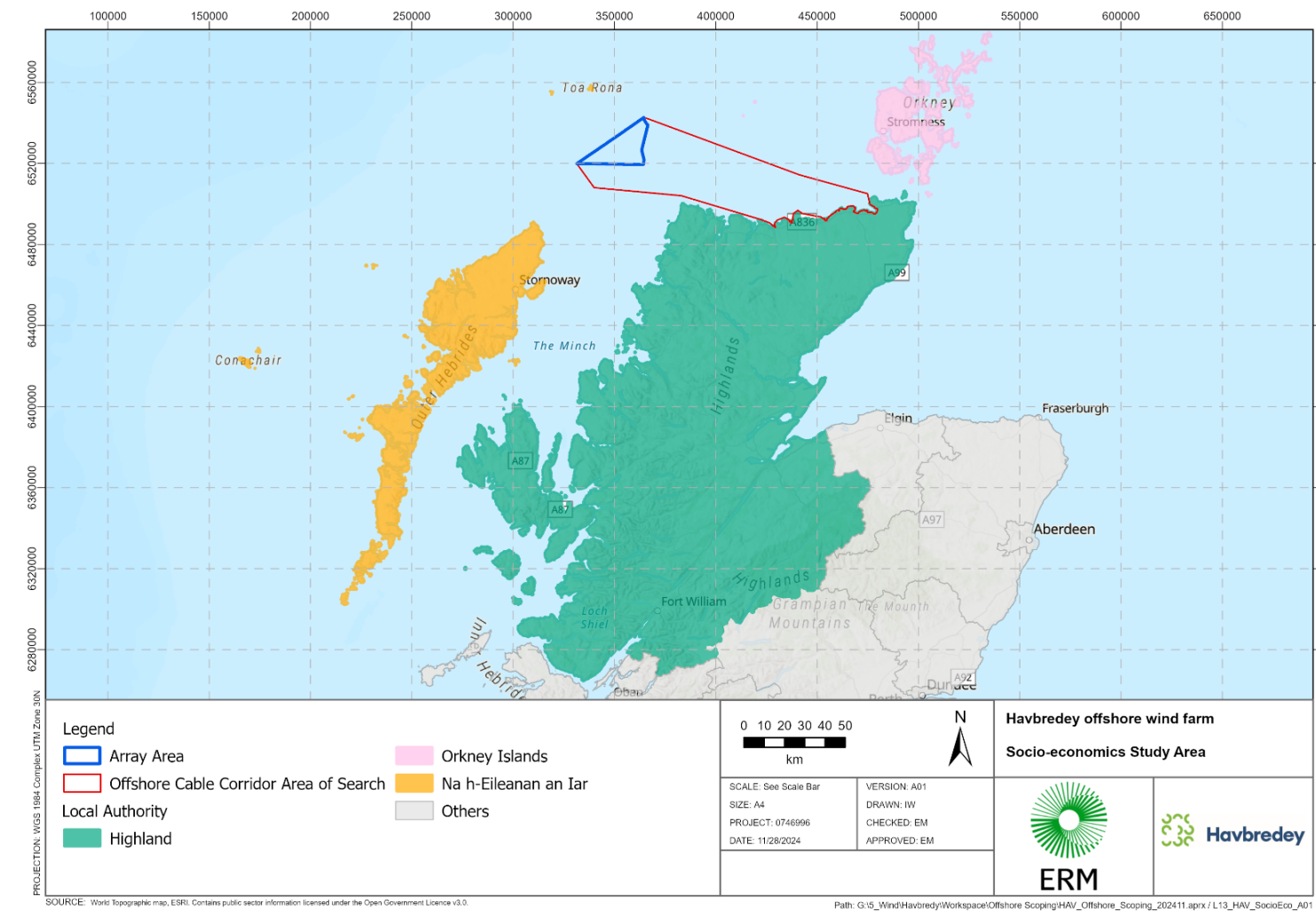



Figure 6.16-1 Socio-economics Study Area

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6.16.3. BASELINE ENVIRONMENT

6.16.3.1. Data Sources

Data sources used to inform this Socio-economics Chapter of the Offshore Scoping Report are presented in Table 6.16-1.

Table 6.16-1 Summary of Key Data Sources for Socio-economics

Source	Spatial Coverage	Year	Summary
National Records of Scotland (NRS), Scotland's Census	Scotland	2022	Population and age profile
Scottish Government (SG), Scottish Index of Multiple Deprivation (SIMD)	Scotland	2020	Multiple deprivation and deprivation by domain at data zone level
Office for National Statistics (ONS), Annual Population Survey (APS)	Scotland; UK	2024	Employment and economic activity
ONS, Business Register and Employment Survey (BRES)	Scotland; UK	2023	Employment by sector
ONS, Annual Survey of Hours and Earnings (ASHE)	Scotland; UK	2023	Workplace and residence-based earnings

6.16.3.2. Overview of the Baseline Environment

In support of this Offshore Scoping Report, an initial desk-based review of available data sources (see Table 6.16-1) has been undertaken; the findings are presented below to provide an understanding of the baseline environment for socio-economics.

Data from the 2022 Census (NRS, 2022) shows that the three local authority areas that make up the Socio-economics Study Area have a combined population of 283,449. The majority (235,351) live in the Highland Council area, with smaller populations in Na h-Eileanan Siar (26,140) and the Orkney Islands (21,958). As shown in Figure 6.16-2, all three areas have a smaller proportion of residents who are of working age than the Scottish average, and a larger proportion of residents aged 65 and over.

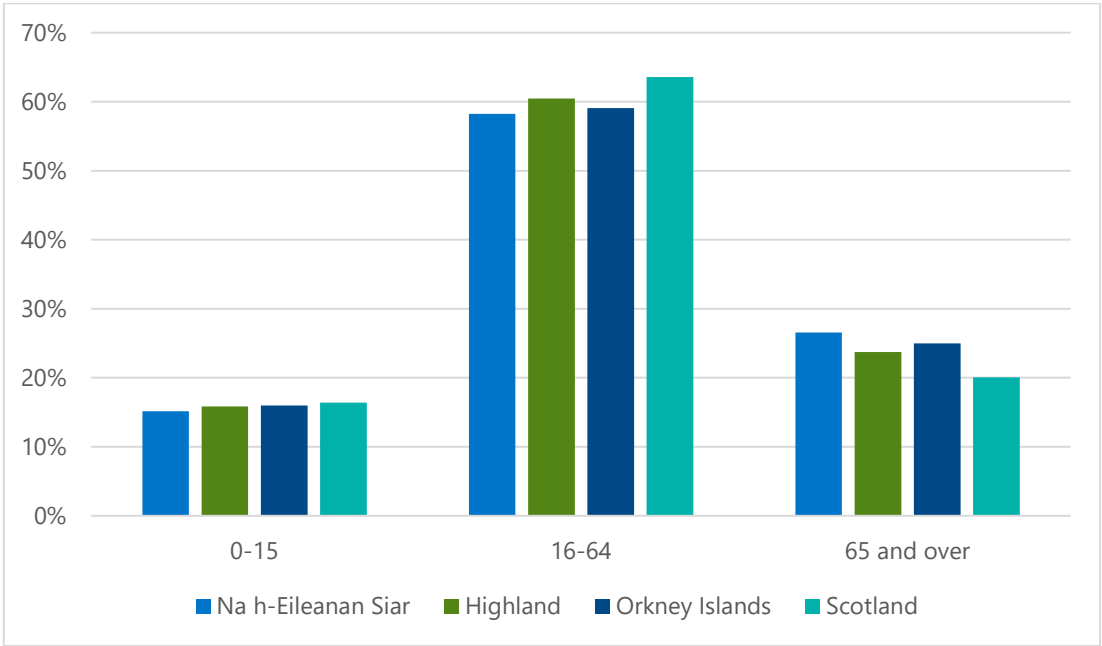


Figure 6.16-2 Population by Age (Source: NRS, Census 2022)

Table 6.16-2 below uses data for the year July 2023-June 2024 and shows the rates of economic activity, economic inactivity, and employment, for the local authorities in the Socio-economics Study Area and for Scotland (ONS, 2024a). All three local authorities record higher than average economic activity, and lower than average economic inactivity. Economic activity is highest in the Orkney Islands, at 86.3%, compared with 77.3% across Scotland.

Data on unemployment is not available for the three local authorities as the numbers involved are so small that they are considered disclosive, however it is notable that the rate of employment in Highland and the Orkney Islands is the same as the rate of economic activity, suggesting that unemployment in those areas is minimal. The rate of employment in Na h-Eileanan Siar is slightly lower than the rate of economic activity, however it is likely that unemployment is below the Scottish average of 3.7%.

Table 6.16-2 Economic Activity (Source: ONS, APS 2024)

	Na h-Eileanan Siar	Highland	Orkney Islands	Scotland
Economic activity rate (aged 16-64)	80.7%	78.4%	86.3%	77.3%
Economic inactivity rate (aged 16-64)	19.3%	21.6%	13.7%	22.7%
Employment rate (aged 16-64)	79.2%	78.4%	86.3%	74.5%
Unemployment rate (aged 16-64)	Not available	Not available	Not available	3.7%



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Table 6.16-3 below uses BRES data for 2023 and shows employment by sector across the three local authority areas and Scotland (ONS, 2023b). Employment in agriculture, forestry and fishing is considerably higher than average, particularly in the Orkney Islands where 10.4% of employees are in this sector, compared with 2% for Scotland. Also notable is the above average employment in mining, quarrying and utilities in Highland (3.4% compared with 2.5% nationally), and above average employment in construction across all three local authority areas. There is also generally above average employment in the health and public administration and defence sectors. The high proportion of employees in accommodation and food services in Na h-Eileanan Siar (10.4%) and Highland (12.8%) indicates the importance of tourism in these areas.

Table 6.16-3 Employment by Sector (Source: ONS, BRES 2023)

Sector	Na h-Eileanan Siar	Highland	Orkney Islands	Scotland
Agriculture, forestry and fishing	7.5%	5.1%	10.4%	2%
Mining, quarrying and utilities	1.2%	3.4%	1.5%	2.5%
Manufacturing	7.5%	5.1%	4.2%	6.9%
Construction	5.8%	6%	5.8%	5.1%
Motor trades	1%	1.9%	0.8%	1.6%
Wholesale	1.9%	2.6%	2.1%	2.8%
Retail	8.3%	9.4%	8.3%	8.7%
Transport and storage	5%	5.1%	8.3%	4.5%
Accommodation and food services	10.4%	12.8%	6.7%	8.7%
Information and communication	1.7%	1.9%	1.9%	3.2%
Financial and insurance	0.6%	0.7%	0.4%	3.3%
Property	1.2%	1.3%	0.6%	1.4%
Professional, scientific and technical	3.3%	5.1%	5%	7.2%
Business administration and support services	3.3%	5.1%	2.5%	6.9%
Public administration and defence	10.4%	5.1%	8.3%	6.4%
Education	7.5%	7.7%	7.5%	8.4%
Health	18.8%	17.1%	16.7%	16%
Arts, entertainment, recreation and other services	2.9%	5.1%	5.8%	4.4%

Figure 6.16-3 shows multiple deprivation across the Socio-economics Study Area (SG, 2020). The Socio-economics Study Area has generally low multiple deprivation, although there are pockets of higher deprivation concentrated in the towns of Stornoway (Na h-Eileanan Siar) and Kirkwall (the Orkney Islands). Multiple deprivation across The Highland Council area is also generally concentrated in more urban areas,

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including for example in Inverness, Dingwall, Wick and Fort William. In relation to the access to services domain of deprivation, however, deprivation is generally high across the Socio-economics Study Area, particularly in more rural areas.

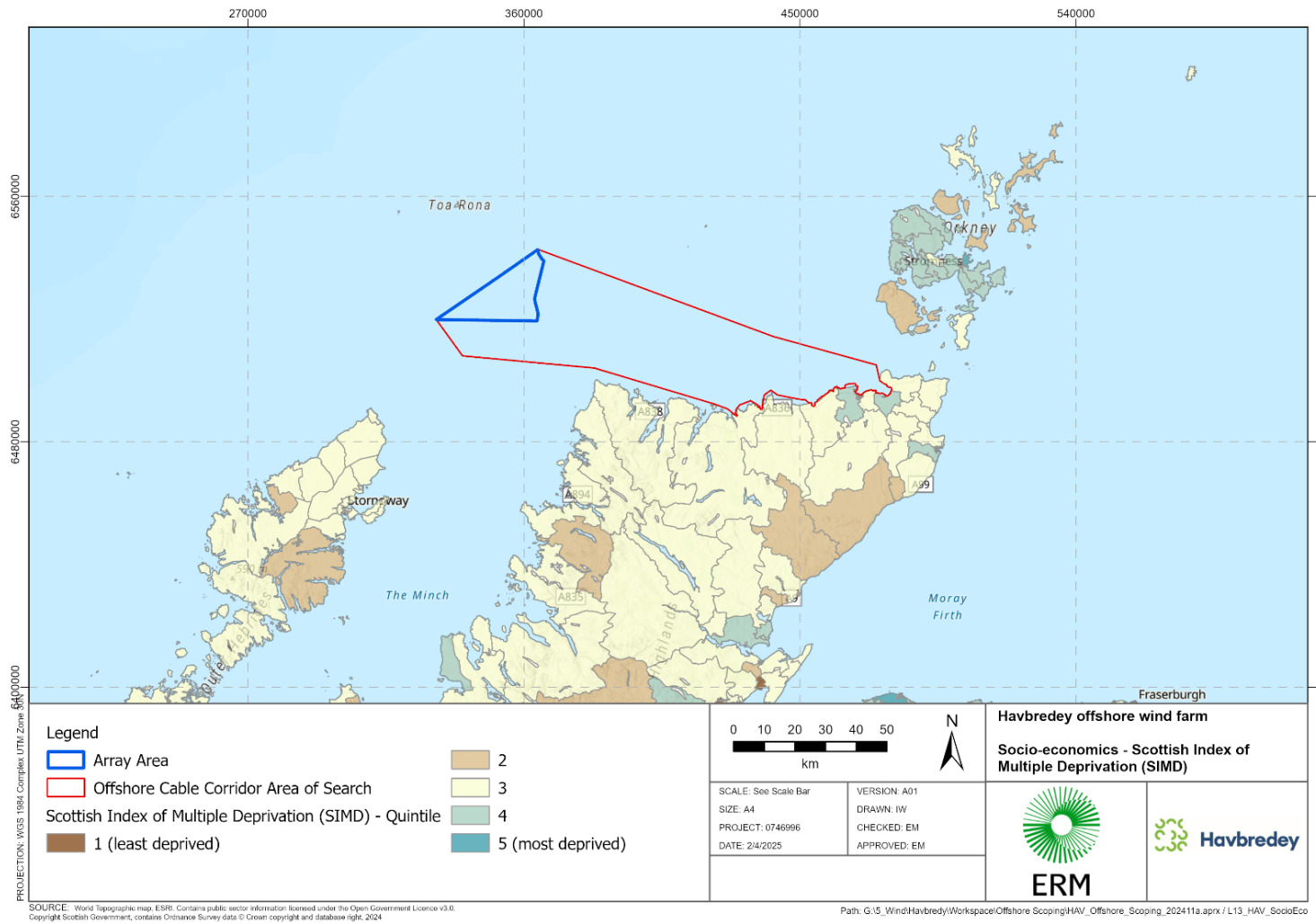


Figure 6.16-3 Multiple Deprivation Across the Socio-Economics Study Area (SG, 2020)

Figure 6.16-4 shows median weekly pay for the three local authorities in the Socio-economics Study Area and for Scotland, on a resident and workplace basis (ONS, 2023a). It is notable that the Orkney Islands record considerably higher than average rates of pay both for residents and for those working on the islands. In Na h-Eileanan Siar, resident-based pay is above average, however workplace-based pay is below average. In Highland, resident-based pay is slightly above average, with workplace-based pay again below average.

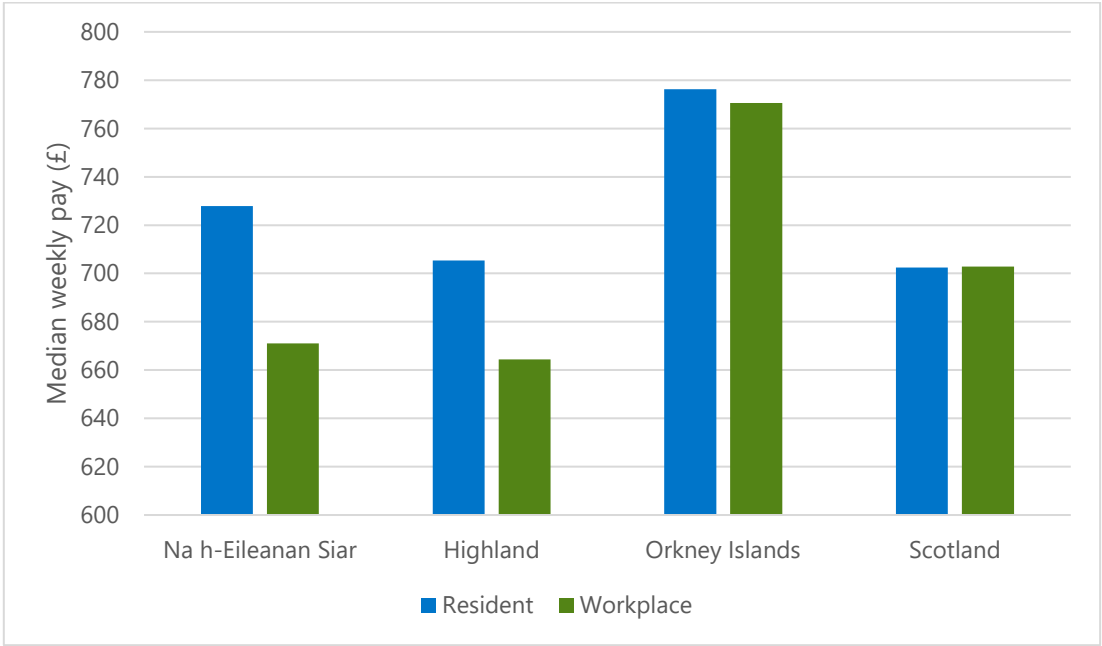


Figure 6.16-4 Median Weekly Pay for Full-time Workers (Source: ONS, ASHE, 2023)

6.16.4. DESIGNED IN MITIGATION

There is no designed in mitigation relevant to the socio-economics assessment at this stage. Should the assessment process identify that mitigation measures may be required, either to reduce or remove negative impacts or to enhance or support the delivery of positive impacts, these will be developed in consultation with the Applicant and drawing on feedback from stakeholders.

6.16.5. SUMMARY OF KEY RECEPTORS, SENSITIVITIES AND LIKELY SIGNIFICANT EFFECTS

The key receptors for socio-economics are:

- The local, regional and national labour market
- The local, regional and national supply chains
- The local, regional and national economy

6.16.5.1.Likely Significant Effects

The scoping of likely significant effects on socio-economics receptors which may arise within the Socio-economics Study Area via the Offshore Project, is outlined in Table 6.16-4 below.




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Table 6.16-4 EIA Scoping Assessment for Socio-economics


Potential Impact	Scoping Result	Justification	Assessment Method
Employment and supply chain impacts	In	The construction and decommissioning of the Offshore Project will create employment directly and in the supply chain which could have the potential for a significant effect. This is therefore scoped into the assessment.	An economic impact model will be developed to estimate direct, indirect and induced employment impacts at local, regional and national scales, taking account of factors including leakage and displacement.
Gross Value Added (GVA) impacts	In	The construction and decommissioning of the Offshore Project will generate GVA in the local, regional and national economy which could have the potential for a significant effect. This is therefore scoped into the assessment.	The economic impact model will estimate direct, indirect and induced GVA impacts at local, regional and national scales, taking account of factors including leakage and displacement.
Wider socio-economic effects	In	The construction and decommissioning of the Offshore Project could have wider and knock-on socio-economic impacts including potential structural economic change or disruption to established local industries such as tourism and commercial fishing.	Qualitative assessment taking account of baseline conditions including local business demographics and key sectors.
Socio-cultural effects	In	Changes to local demographics and the local environment associated with an incoming construction workforce could result in impacts such as increased demand for social and community infrastructure and services (including	Qualitative assessment taking account of baseline conditions including local community demographics, housing and service provision.

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Potential Impact	Scoping Result	Justification	Assessment Method
		housing, education and health), and changes in community identity and way of life.	
Employment and supply chain effects	In	The operation and maintenance phase of the Offshore Project will create employment directly and in the supply chain which could have the potential for a significant effect. This is therefore scoped into the assessment.	An economic impact model will be developed to estimate direct, indirect and induced employment impacts at local, regional and national scales, taking account of factors including leakage and displacement.
GVA effects	In	The operation and maintenance phase of the Offshore Project will generate GVA in the local, regional and national economy which could have the potential for a significant effect. This is therefore scoped into the assessment.	The economic impact model will estimate direct, indirect and induced GVA impacts at local, regional and national scales, taking account of factors including leakage and displacement.
Wider socio-economic effects	In	The operation and maintenance of the Offshore Project could have wider and knock-on socio-economic impacts including potential structural economic change or disruption to established local industries such as tourism and commercial fishing.	Qualitative assessment taking account of baseline conditions including local business demographics and key sectors.
Socio-cultural effects	Out	It is anticipated that operational employment will be relatively small, and that there would not be a significant effect on local demographics or	N/A

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Potential Impact	Scoping Result	Justification	Assessment Method
		service provision due to an incoming workforce during operation and maintenance.	

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6.16.6. PROPOSED APPROACH TO EIA

6.16.6.1. Relevant Data Sources

Data sources listed within Table 6.16-1, alongside further secondary data sources including published and unpublished papers, journals and reports will be used to inform the EIA. These sources may be further supplemented by any additional material identified during stakeholder consultation.

In addition to the data sources highlighted in Table 6.16-1, the following additional data sources will be used:

- ONS, Regional GVA
- ONS, Business Demography
- ONS, Claimant Count
- NRS, Sub-national population projections
- Relevant publications from the local authorities within the Socio-economics Study Area and from organisations such as Highlands and Islands Enterprise

The baseline for the EIA will also consider data from sources listed in Table 6.16-1, including the 2022 Census and the most recent APS (updates to the APS are published quarterly), for a wider range of indicators, including demographics, housing, skills and qualifications.


The baseline and assessment for socio-economics will be desk-based and will not require any surveys. It will draw on the findings of consultation and stakeholder engagement, as set out below.

6.16.6.2. Consultation

Consultation and engagement will be key to confirm the methodology and approach to the assessment. Throughout the EIA process, collaboration between the Offshore Project team and external stakeholders will be established. Organisations that will be consulted with respect to socio-economics, include:

- Comhairle nan Eilean Siar
- The Highland Council
- Orkney Islands Council

The socio-economics chapter will also draw on stakeholder feedback received through the public consultation process, particularly in terms of community impacts and perceptions of the Offshore Project. Further information on the approach to consultation for the Offshore Project is available in Chapter 5: Consultation.

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6.16.6.3. Policy, Legislation and Guidance

The assessment of socio-economics will consider the legislation, policy and guidance listed below (Table 6.16-5).

Table 6.16-5 Legislation, Policy and Guidance Relevant to the Socio-economics Assessment

Relevant Legislation, Policy and Guidance
Legislation and Policy
Marine Scotland Act, 2010
Marine and Coastal Access Act, 2009
Environmental Assessment (Scotland) Act, 2009
NPF4, 2023
The National Islands Plan, 2020
Scotland's National Marine Plan, 2015
Sectoral Marine Plan (North)
Blue Economy Vision for Scotland, 2022
Scotland's National Strategy for Economic Transformation, 2022
Build Back Better: Our Plan for Growth, 2021
The Highland-wide Local Development Plan, 2012
Evidence papers to support the emerging Highland Local Development Plan ¹⁹
Caithness and Sutherland Local Development Plan, 2018
Inner Moray Firth Local Development Plan, 2024
West Highland and Islands Local Development Plan, 2019
Outer Hebrides Local Development Plan, 2018
Orkney Local Development Plan, 2017
Guidance
Scottish Government Marine Directorate, General advice for socio-economic impact assessment
Scottish Government Marine Directorate, Offshore renewables – social impact: two-way conversation with the people of Scotland
Scottish Government Marine Directorate, Marine Analytical Unit annex on assessing economic effects
Marine Scotland, Defining 'local area' for assessing impact of offshore renewables and other marine developments: guidance principles
Scottish Government Agriculture and Rural Economy Directorate, Island Communities Impact Assessments: Guidance and toolkit

¹⁹ The evidence papers will form the basis of the new Highland Local Development Plan. Feedback on the evidence papers will inform the preparation of an 'Evidence Report', which will undergo independent review later in 2025. Following this review, a draft plan will be prepared. The exact release date of the final HLDP has not been specified at this stage.

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Relevant Legislation, Policy and Guidance

Vattenfall, Guidance on assessing the socio-economic impacts of offshore wind farms (OWFs)

6.16.6.4. Assessment Methodology

The assessment will follow the methodology described in Chapter 4: Proposed Approach of EIA. Further refinement of the methodology will be undertaken prior to the chapter being prepared as part of the baseline and stakeholder engagement. Cumulative and transboundary effects are also discussed in Chapter 4: Proposed Approach to EIA, and assessment of these will apply to socio-economics.

A key aim of the socio-economics assessment is to further understand and characterise the existing environment in the Socio-economics Study Area. A greater understanding of the key receptors identified, including the local, regional and national economy, labour market, and supply chain, will assist in providing a firm baseline for any potential effect of the Offshore Project.

Magnitude and duration of impact will be considered under the socio-economics assessment, alongside the reversibility of the impact and the timing and frequency of the activity. An assessment of the likely significant effects of the Offshore Project will be undertaken through application of the evidence base.


An economic model will be built, following industry best practice and drawing on published guidance and specialist knowledge, to estimate the direct, indirect and induced employment and GVA effects of the Project, at local, regional and national levels. Wider economic effects and socio-cultural effects will be assessed, drawing on the baseline, stakeholder feedback, the findings of the economic model, and professional judgement. The assessment will also draw on the findings of other relevant assessments, including Commercial Fisheries; Infrastructure, Other Sea Users, Tourism and Recreation; and Seascape, Landscape and Visual, where appropriate.

Stakeholder consultation will be undertaken at pivotal points throughout the EIA process to ensure that the approach, including the application of the evidence base, satisfies the requirements of both stakeholders and regulators, such as after scoping and at the draft production of the chapter during the Offshore EIAR (see Chapter 5: Consultation).

6.16.7. SCOPING QUESTIONS FOR CONSULTEES

Scoping questions for consultees in relation to the socio-economics assessment include:

1. Do you agree that the data sources referenced above to inform the baseline are valid and sufficient for the purposes of this scoping assessment?
2. Have all socio-economics receptors and potential impacts that could result from the Offshore Project been identified?

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3. Do you agree with the proposed approach to assessment (scoped in or out) for each of the impacts for socio-economics?
4. Do you agree with the assessment methodology proposed to be undertaken within the Offshore EIAR?

6.16.8. REFERENCES

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7. PROPOSED OFFSHORE EIAR STRUCTURE

This chapter outlines the proposed structure of the Offshore EIAR. The Offshore EIAR will consist of four volumes, Table 7-1 lists the proposed introductory chapters to be included in Volume I and the proposed topic specific chapters to be scoped in and included in Volume II.


Table 7-1 Proposed Offshore EIAR Structure

Volume	Chapter Number	Chapter Title
I	N/a	Non-Technical Summary
	1	Introduction
	2	Policy and Legislative Context
	3	Consideration of Alternatives
	4	Project Description
	5	Approach to EIA
II	6	Physical and Coastal Processes
	7	Marine Sediment and Water Quality
	8	Benthic and Intertidal Ecology
	9	Fish and Shellfish Ecology
	10	Marine Mammals and Other Megafauna
	11	Marine and Intertidal Ornithology
	12	Marine and Intertidal Archaeology and Cultural Heritage
	13	Commercial Fisheries
	14	Shipping and Navigation
	15	Radar and Aviation
	16	Offshore Infrastructure, Other Sea Users, Tourism and Recreation
	17	Seascape, Landscape and Visual
	18	Climate
	19	Socio-Economics
	20	Summary of Offshore Mitigation / Statement of Offshore EIA Commitments
III	Appendices	Technical Appendices
IV	N/a	Outline Management Plans

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7.1. SCOPING QUESTIONS FOR CONSULTEES

1. Do you agree with the proposed structure of the Offshore EIAR?
2. Are there any topics you feel should also be scoped into the Offshore EIAR that are not listed above?

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APPENDIX 1 – NOTE ON MARINE AND INTERTIDAL ORNITHOLOGY ASSESSMENT

METHODOLOGY FOR THE HAVBREDEY OFFSHORE WIND FARM

1 Summary

This note provides a summary of the proposed methods and parameters to be used in the ornithology assessments for Havbredey Offshore Wind Farm and highlights any key queries for discussion during the scoping workshop. These are informed by the most recent available guidance and advice for other projects.

2 Determination of reference populations for EIA

Reference populations, against which impacts will be assessed in the EIA, will be derived from species specific foraging ranges (Woodward *et al.* 2019) for the breeding season and from BDMPS as defined by Furness (2015).


For non-breeding season populations, the regions defined by Furness (2015) will be applied. The seasonality will also be applied where this aligns with those published by NatureScot (2020). Where seasons do not align, populations will be adjusted to account for the differences in seasonality between Furness (2015) and Scotland (NatureScot, 2020).

In the breeding season, the population is formed of breeding adults plus immature birds and non-breeding adults (Furness, 2015). To obtain a population estimate, the counts conducted at all breeding colonies within species specific foraging ranges (Woodward *et al.* 2019) will be applied. However, these counts only account for breeding individuals, therefore, adjustments will be applied to the total breeding season reference population. The adjustments will be made based on the ratio of immature to adult birds presented by Furness (2015) and/or Horswill and Robinson (2015).

3 Proposed displacement and mortality rates for use in assessment of displacement effects

As per recent advice in *Guidance Note 8: Guidance to support Offshore Wind Applications: Marine Ornithology Advice for assessing the distributional responses, displacement, and barrier effects of marine birds* (NatureScot, 2023), displacement effects and barrier effects will be considered together as one impact, termed 'Distributional Responses'.

The assessment will be based on the 'matrix approach' where a displacement rate and a mortality rate is applied to the mean seasonal peak abundance within the Array Area plus suitable buffer (2 km for all species except divers and scoters). NatureScot (2023) recommend a range of rates, as presented in Table A-1, ranging from 30 to 70% displacement and up to 5% mortality.

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Based on the data collected and review of displacement at existing developments (APEM, 2022), the NatureScot (2023) rates may result in overestimation of impacts to displaced birds. Therefore, alongside the rates presented below, where appropriate, additional rates may also be presented in the assessment of distributional responses. Use of alternative rates will be discussed with NatureScot and supported by review of available evidence.

Table A-1 Recommended Seabird Displacement and Mortality Rates (Source: NatureScot, 2023)

Common Name	Scientific Name	Displacement Rate	Mortality Rate (breeding)	Mortality Rate (non-breeding)
Northern gannet	<i>Morus bassanus</i>	70%	1% and 3%	1% and 3%
Atlantic puffin	<i>Fratercula arctica</i>	60%	3% and 5%	1% and 3%
Common guillemot	<i>Uria aalge</i>			
Razorbill	<i>Alca torda</i>			
Black-legged kittiwake	<i>Rissa tridactyla</i>	30%	1% and 3%	1% and 3%

Other key parameters include:

- Array Area plus 2.0 km displacement buffer.


4 Key parameters from collision risk modelling e.g. avoidance rates and nocturnal activity rates

As recommended in *Guidance Note 7: Guidance to support Offshore Wind Applications: Marine Ornithology - Advice for assessing collision risk of marine birds* (NatureScot, 2023), impacts will be assessed through stochastic CRM (sCRM), in the most up to date tool (Caneco, 2022).

A minimum of four sCRM scenarios will be run for each species sensitive to collision risk:

- Most likely scenario with sCRM Option 2
- Most likely scenario with sCRM Option 3
- Worst-case scenario with sCRM Option 2
- Worst-case scenario with sCRM Option 3

The proposed parameters to be used in assessment of collision risk are outlined below.

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4.1 Wind farm/turbine parameters:

CRM will be conducted for the worst-case proposed turbine design from a collision perspective. Turbine parameters to be included in sCRM from the Offshore PDE are as follows:


- Number of turbines
- Maximum wind farm width
- Tidal offset (0 m, as used for floating developments)
- No. of blades (3)
- Rotor radius
- Air gap (≥ 22 m)
- Max blade width
- Monthly operation (wind availability, mean downtime, SD)
- Rotation speed (and SD) **and** blade pitch (and SD) **or** wind speed relationship)

4.2 Seabird parameters

Proposed seabird parameters for sCRM are presented in Table A-2, as taken from NatureScot (2023) guidance and the default parameters in the most recent version of the sCRM Tool (Caneco, 2022). It is noted that some parameters for some species are not presented, in such cases, the values to be used will be agreed through discussion with NatureScot prior to assessment.

Table A-2 Non-Exhaustive List of Proposed Seabird Parameters for sCRM

Species*	Body Length (m) (SD)	Wingspan (m) (SD)	Flight speed (ms^{-1}) (SD)	Nocturnal activity (%) (SD)	Flight type (flapping or gliding)
Gannet	0.94 (0.0325)	1.72 (0.0375)	14.9 (0)	0.08 (0.10)	Gliding
Fulmar**	0.45 (0.025)	1.07 (0.025)	13 (0)	To be confirmed (TBC)	Flapping
Kittiwake	0.39 (0.005)	1.08 (0.0625)	13.1 (0.40)	TBC	Flapping
Herring gull	0.6 (0.0225)	1.44 (0.03)	12.8 (1.80)	TBC	Flapping
Great black-backed gull	0.71 (0.035)	1.58 (0.0375)	13.7 (1.20)	TBC	Flapping
Common tern**	0.33 (0.01)	0.88 (0.525)	10.9 (0)	TBC	Flapping
Black-headed gull	TBC	TBC	TBC	TBC	Flapping
* Species observed in site-specific DAS; final site-specific DAS report will determine requirement for inclusion in CRM.					
** Parameters from Caneco (2022).					

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4.3 Avoidance rates

Proposed avoidance rates for use in the sCRM are presented in Table A-3, based on NatureScot (2023) interim guidance. CRM will be run using these recommended avoidance rates, with both deterministic and stochastic values presented. Collision estimates will include additional context based on option 3 (extended) sCRM by Ozsanlav-Harris *et al.* (2023) and, where available, site-specific flight height data (Options 1 and 4) to inform reliable analyses. It is noted that some species are not included in the guidance, in which case, NatureScot will be consulted with on appropriate avoidance rates prior to undertaking the assessment.


At present, known alternatives to the recommended rates presented in Table A-3 include gannet, where different rates can, and have been in recent application submissions, be applied to the breeding and non-breeding season. This includes running additional CRM scenarios to consider:

- 98% avoidance during the breeding season
- 70% reduction in collision estimates during the non-breeding season

The former will be provided for additional context, as recommended by RSPB and advised by NatureScot. This lower avoidance rate considers that most studies and data used to inform the recommended rates are collect from gannets during the non-breeding season. The latter, where collision estimates are reduced by 70% in the non-breeding season (equivalent to applying 0.9976 and 0.9979 avoidance rates for the basic and stochastic models, respectively) will be applied based on guidance from JNCC *et al.* (2024). This accounts for the fact that during the non-breeding season, gannets are not constrained to foraging areas by the need to attend a specific nesting site, therefore, have increased capacity to actively avoid the Array Area. The above considerations will be presented alongside the recommended rates and were discussed and agreed with NatureScot and the RSPB at the ornithology scoping workshop on 14 January 2025 (NatureScot, pers. comm.; RSPB, pers. comm.).

Table A-3 Non-Exhaustive List of Avoidance Rates for Each Species Used in the Basic Band and Stochastic Risk Models as per NatureScot (2023)

Species	Basic (deterministic)	sCRM
Gannet	0.992	0.993 (± 0.0003)
Kittiwake	0.992	0.993 (± 0.0003)
Lesser black-backed gull	0.994	0.994 (± 0.0004)
Herring gull	0.994	0.994 (± 0.0004)
Great black-backed gull	0.994	0.994 (± 0.0004)
Other Species	0.990	0.991 (± 0.0004)

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4.4 Points requiring further discussion relating to collision risk modelling

- Agreement on using final 2-year site-specific DAS report and data analysis to inform which species are to be included in CRM
- Agreement with the parameters outlined above, and discussion to decide on parameters for species not included in guidance
- Agreement of inclusion of any site-specific seabird parameters (flight height, flight speed, etc.) in CRM, assuming sufficient quantity and quality of data are collected to calculate such parameters

5 Population Viability Analysis (PVA)

Should PVA be required, the most recent guidance, as outlined in *Guidance Note 11: Guidance to support Offshore Wind Applications: Marine Ornithology - Recommendations for seabird Population Viability Analysis* (NatureScot, 2023) will be adhered to. This notes that a range of elements should be considered, including short- and long-term trends, life history, species and population importance, and climate change.

Counterfactuals of population size and population growth rate key metrics are proposed to be reported as outputs from the PVA (Green, 2014; Cook and Robinson, 2016; Jital *et al.* 2017).

5.1 Model duration:

Three PVA scenarios will be run:


- 1) Comparison of the impacted and unimpacted (baseline) population over a 25-year scenario
- 2) Comparison of the impacted and unimpacted (baseline) population over a 35-year scenario (the Offshore Project lifespan)
- 3) Comparison of the impacted and unimpacted (baseline) population over a 50-year scenario

5.2 Demographic parameters (as required from Horswill and Robinson (2015) and the Seabird Monitoring Programme database (Massimino *et al.* 2019)):

- Age classes (Horswill and Robinson, 2015)
- Productivity rates (Horswill and Robinson, 2015)
- Survival rates (Horswill and Robinson, 2015)
- Reference populations sourced from the Seabird Monitoring Programme database (Massimino *et al.* 2019)

5.3 Points requiring further discussion relating to PVA:

- Identification of any additional site (SPA) or colony-specific demographic data which should be used in PVA in place of the data provided by Horswill and Robinson (2015) and BTO (2024)

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6 SeabORD


SeabORD (Searle *et al.* 2018) could be used to assess displacement and barrier effects to SPA populations of breeding birds.

At present, it is noted that the tool is only appropriate for assessment of impacts to kittiwake and auks (guillemot, puffin, and razorbill) during the chick-rearing period; however, the Applicant is aware that NatureScot has investigated the potential for using the tool during the full breeding season and for additional species (Searle *et al.* 2022).

If SeabORD is selected as the assessment method for displacement effects, where applicable, the distance decay approach will be utilised. This approach employs site-specific DAS data, rather than project-specific tracking data, which are not being collected as part of the baseline studies.

6.1 Points requiring further discussion relating to SeabORD:


- Agreement on utilisation of SeabORD for assessment to auks and kittiwake during the chick-rearing period, or whether to use the displacement matrix approach (as previously outlined in Section 2 of this appendix) for all seasons
- Agreement on using a uniform prey distribution, or identification of any prey distribution data that may be available for the region, which can be used in the SeabORD tool
- Identification of and agreement of which seabird colonies/SPA populations should be assessed using the SeabORD Tool
- Agreement on how impacts estimated using SeabORD should be combined or compared with impacts assessed using Displacement Matrices

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APPENDIX 2 – GLOSSARY AND ACRONYMS

GLOSSARY


Term/Abbreviation	Definition
Action Levels	Threshold values for a number of sediment contaminants as characterised by the Centre for Environment, Fisheries and Aquaculture Science (Cefas).
Admiralty Charts	Nautical charts that provide a graphic representation of a marine area and adjacent coastal regions, including features such as water depths, navigational dangers, seabed features, aids to navigation, and more.
Air Gap	Minimum distance between blade tip height and sea level.
Air Operating Certificate	Enables aircraft operators to fly from point A to point B. The conditions attached to a full Air Operating Certificate (AOC) will be determined by the competence and ambitions of the organisation.
Allision	Allision is a nautical term that refers to a maritime accident where a moving vessel hits a fixed or moored stationary object, such an offshore structure, including moored floating wind turbines.
Anadromous species	Fish species that spend the majority of their life in salt water but migrate annually into freshwater to spawn.
Annex I Habitat	Habitat as defined under the EU Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora.
Applicant	Havbredey Limited (Company Number SC717714).
Area to be Avoided	An area within defined limits in which either navigation is particularly hazardous or it is exceptionally important to avoid casualties and which should be avoided by all ships, or by certain classes of ships.
Array Area	The area as identified by the blue line boundary in Figure 1-1 in which the wind turbine generators (WTGs), associated moorings and anchors, the dynamic and static inter-array cables and offshore platform structures (as required) are located.
As Low As Reasonably Practicable	As low as reasonably practicable is a principle used to manage and regulate safety-critical systems. It is a risk management concept that involves balancing the level of risk against the cost, time, and effort required to reduce it.
Back Links	Connect WTGs at the end of two strings, allowing for partial re-routing of power in case of cable failure.
Benthic	Living on or in the seabed.
Blue Carbon	Carbon stored in coastal and marine ecosystems.

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Term/Abbreviation	Definition
Canmore	Canmore contains more than 320,000 records and 1.3 million catalogue entries for archaeological sites, buildings, industry and maritime heritage across Scotland. Compiled and managed by HES, Canmore contains information and collections from all its survey and recording work, as well as from a wide range of other organisations, communities and individuals who are helping to enhance this national resource.
Catadromous species	Fish species that spend the majority of their life in freshwater but migrate annually into salt water to spawn.
Danger Area	An area of airspace within which activities dangerous to the flight of aircraft may be taking place. These activities usually involve some form of live military training or testing.
Dead Shipwreck	A wreck that has been lost or is too destroyed to be seen.
Demersal	Species relating closely to the seabed. Demersal spawning species are those which deposit eggs onto the seabed.
Demersal Spawning	Eggs are released directly onto or near the seabed, often attaching them to substrates.
Diadromous	Fish that move during their life cycle between fresh and marine water.
DTM	Ground topography data of ground height and landform at set resolution excludes buildings and vegetation.
Dounreay FEPA Order Zone	An area near the Dounreay nuclear power station in Scotland where the Order prohibits the harvesting of seafood. This order was established in 1997 after fragments of irradiated nuclear fuel, known as "hot particles", were discovered on the seabed. Defined as a zone established by order whereby no person can fish for and take any species of demersal or pelagic fish, molluscs or crustaceans in the designated area as species may be affected by fragments of irradiated nuclear fuel and if consumed are likely to create a hazard to human health.
Dredge	A fishing method in which a dredge is dragged across the sea floor, either scraping or penetrating the bottom, catching bivalve molluscs such as oysters, clams and scallops.
Dynamic Cable	A cable suspended between a floating structure and the seabed.
Elasmobranchs	A subclass of cartilaginous fish including sharks, rays, and skates.
Electro Magnetic Fields	Electrical transmission infrastructure generates both an electric field (E-field) and a magnetic field (B-field) when in operation, collectively termed an EMF.
Environmental Quality Standards	UK statutory thresholds, setting out limits for various priority substances and hazardous priority substances in water.

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Term/Abbreviation	Definition
Feeding Ground	Specific areas where marine species gather to feed, often characterised by high prey availability and suitable habitat conditions. Feeding grounds are essential for growth and energy acquisition.
Fishery	The sum of all fishing activities on a given resource, or activity of catching fish from one or more stocks, or may refer to a single type or style of fishing.
Foraging Range	The area over which an animal searches for food; this range can vary based on species, prey availability, and environmental conditions, influencing feeding behaviour and energy expenditure.
Ghost Fishing	The phenomenon whereby lost nets or traps continue to capture or entangle fish.
Good Ecological Potential	<p>The WFD default objective for all artificial water bodies (AWB) and heavily modified water bodies (HMWB) and is defined as the equivalent to Good Ecological Status (GES) taking into consideration the characteristics of the water body.</p> <p>The ecological potential of a water body represents the degree to which the quality of the water body's aquatic ecosystem approaches the maximum it could achieve.</p>
Greenhouse Gas	Gases that trap heat in the Earth's atmosphere.
Habitat Type	A specific definition of a type of habitat, which provides essential resources like food, water, shelter and space to support species.
Hazard Workshop	A hazard workshop is a key tool used in the Navigational Risk Assessment process to identify and qualify all risks. The workshop ensures that risks are agreed upon with relevant consultees as part of the process.
Hominid	Early erect bipedal primate mammals that includes recent humans as well as extinct ancestral or related forms.
Hydromorphology	Considers the physical character and water content of water bodies.
ICES Statistical Rectangles	International Council for Exploration of the Seas (ICES) statistical rectangles are used for the gridding of data to simplify analysis and visualisation.
Icing Level	The level at which the air contains droplets of supercooled liquid water which results in icing conditions where aircraft lift characteristics can be adversely affected.
INNS Management Plan	A plan outlining measures to prevent and control introduction of Invasive Non-Native Species (INNS), including monitoring, prevention and mitigation measures where necessary.
Inshore	Waters which extend from the coast out to 12 nm.

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Term/Abbreviation	Definition
Landfall Area of Search	The area of the Offshore Cable Corridor Area of Search as identified by the green line boundary in Figure 1-2, that interacts with the coastline.
Landscape Character Types	Defined extents of landscape types with descriptions of character and key characteristics and features of that landscape type.
LiDAR	Terrain data derived from satellite imagery to produce a digital terrain or surface model of the ground and or vegetation.
Live Shipwreck	A shipwreck designated as live that has had its location confirmed.
M2	The principal gravitational tide due to the moon.
Migratory	Species that move between different habitats or regions on a seasonal basis, often for breeding, feeding, or environmental conditions (see also anadromous and catadromous).
Military Practice and Exercise Areas (PEXA)	Areas used by the MoD for training the armed forces and practicing military operations, such as firing operations or submarine exercises.
N2 Plan Option Area	Areas identified in the first Scotwind Leasing round by Crown Estate Scotland. For Havbredey Offshore Wind Farm this was 'N2'.
National Coastal Character Types	Defined areas of coastal landscape with descriptions of character and key characteristics and features of that landscape.
Nursery Grounds	Specific areas where juvenile fish and shellfish grow and develop, often providing shelter and abundant food sources crucial for survival in early life stages.
Oceanography	The study of the oceans that includes biology, chemistry, physics and geology.
Offshore Cable Corridor Area of Search	An area of search in which the offshore export cable and reactive compensation stations (RCSs) (if required) are located between Array Area and Landfall Area of Search as identified by the red line boundary in Figure 1-1.
Offshore Project	The offshore elements of the Project.
Palaeocoastline	A shoreline that existed in the geologic past.
Palaeolandscape	A landscape or landscape feature that existed in the geologic past.
Pelagic	Species with a close relationship to the water column (e.g. from the sea surface to middle depths of a body of water) that is not close to the seabed.
Pelagic Spawning	Eggs are released to the water column.
Physical and Coastal Processes	The topic of physical processes includes, waves, tides, water column structure. Coastal processes include (but are not limited to) sediment transport, coastal erosion and accretion.
Precautionary Area	An area within defined limits where ships must navigate with particular caution and within which the direction of flow of traffic may be recommended.

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Term/Abbreviation	Definition
Prey Species	Organisms that are hunted and consumed by predators; in marine ecosystems, this includes various fish, invertebrates, and other aquatic animals that serve as food sources for larger species.
Priority Marine Features (PMFs)	A prioritised list of habitats and species of conservation importance in Scotland's seas.
Project	The full proposal for the Havbredey floating offshore wind farm, encompassing the Offshore Project and all onshore works.
Pycnocline	Location in the water column where the strongest vertical density gradient occurs; only occurs in area that stratify. Can be due to temperature or salinity.
S2	The principal gravitational tide due to the sun.
Scottish Offshore Region	Scottish waters between 12 nm and 200 nm offshore.
Scottish Inshore Region	Scottish waters between MHWS and 12 nm offshore.
Sequestered Contaminants	Harmful substances stored within sediments.
Setting	Setting is the way the surroundings of a historic asset or place contribute to how it is understood, appreciated and experienced.
Shellfish	Aquatic invertebrates with an exoskeleton, including crustaceans (e.g., crabs, lobsters) and molluscs (e.g., clams, oysters), often important in fisheries.
Siltation	The settling out or deposit of silt or sediments suspended in the water column to the seabed.
Site-specific Digital Aerial Surveys (DAS)	Seabird and marine mammal monthly DAS covering the Array Area plus a 10 km buffer.
Spawn	Release of eggs into the water and on the seabed, either fertilised or to be fertilised.
Spawning Behaviour	Specific behavioural method by which a species spawns, such as pelagic or demersal spawning.
Spawning Grounds	Specific areas where fish species congregate to spawn.
Special Landscape Area (SLA)	National and/or regional designated areas of land defined as having special landscape qualities.
Static Cable	Cable either buried into or sitting on the seabed.
Suspended Sediment Concentration (SSC)	The total value of both mineral and organic material carried in suspension in the water column.
Thermocline	Location in the water column of the strongest vertical temperature gradient; only occurs in areas that stratify.


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Term/Abbreviation	Definition
Transition Joint Bay (TJB)	Houses the interface between the offshore export cables and onshore export cables.
Turbidity	The measure of relative clarity of a liquid, often water.
UK Offshore wind Sector Deal	A UK policy paper detailing the partnership between government and industry and the targets to raise the productivity and competitiveness of UK companies to ensure the UK continues to play a leading role in the growing global market.
UKHO Admiralty Sailing Directions	Admiralty Sailing Directions (Pilots) provide essential information to support port entry and coastal navigation for all classes of ships at sea.
Under Keel Clearance	Under Keel Clearance is the distance between the bottom of a ship and the seabed. It is a key factor in maritime transport because it ensures that ships can navigate safely and prevents them from running aground.
Wet Storage	In the context of an offshore wind farm, wet storage refers to the practice of temporarily storing offshore infrastructure within the marine environment until being ready for installation, and temporary storage during maintenance activities.
Zone of Theoretical Visibility (ZTV)	Visual analysis of the likely visibility of the Offshore Project based upon terrain data, receptor height and the height of the Offshore Project.


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ACRONYMS


Term/Abbreviation	Definition
µg/kg	Micrograms per kilogram
AA	Appropriate Assessment
AAI	Areas of Archaeological Interest
AD	Air Defence
AEZ	Archaeological Exclusion Zone
AIAA	Area of Intense Aerial Activity
AIS	Automatic Identification System
AL (1 and 2)	Action Levels (1 and 2)
ALARP	As Low as Reasonably Practicable
ANIFPO	Anglo Northern Ireland Fish Producers Organisation
ANO	Air Navigation Order
AOB	Apparently Occupied Burrows
AON	Apparently Occupied Nests
AOS	Apparently Occupied Sites
AOT	Apparently Occupied Territory
APS	Annual Population Survey
ASHE	Annual Survey of Hours and Earnings
ATC	Air Traffic Control
ATS	Air Traffic Services
BDMPS	Biologically Defined Minimum Population Scales
BEIS	Business, Energy and Industrial Strategy
BGS	British Geological Survey
BIIS	British–Irish Ice Sheet
BODC	British Oceanographic Data Centre
BP	Before Present
Bq	Becquerel
BRES	Business Register and Employment Survey
BSH	Broad Scale Habitat
BTO	British Trust for Ornithology
C	Carbon
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CBRA	Cable Burial Risk Assessment
CCC	Climate Change Committee

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Term/Abbreviation	Definition
CCME	Canadian Council of Ministers of the Environment
CCRA	Climate Change Risk Assessment
CCS	Carbon Capture and Storage
CEA	Cumulative Effects Assessment
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CEMP	Construction Environmental Management Plan
CEQG	Canadian Environmental Quality Guidelines
CES	Crown Estate Scotland
CfD	Contracts for Difference
CFLO	Company Fisheries Liaison Officer
cfu	Colony Forming Unit
CGNS	Celtic and Greater North Seas
Chl-α	Chlorophyll α
CIFA	Communities Inshore Fisheries Alliance
CMS	Construction Method Statement
CNS	Communication, Navigation and Surveillance
CO ₂	Carbon Dioxide
CoFu	Coastal Futures
COLREGS	Convention on the International Regulations for Preventing Collisions at Sea
COP21	Conference of the Parties 21
CPC	Counterfactual of Population Growth Rate
CPS	Counterfactual of Final Population Size
CRM	Collision Risk Modelling
CRP	Clear Range Procedure
Cs-137	Caesium 137
CSEMP	Clean Seas Environmental Monitoring Programme
CWSH	Coastal West Scotland & Hebrides
DAS	Digital Aerial Surveys
DBT	Dibutyltin
DDT	Dichlorodiphenyltrichloroethane
DDV	Drop-Down Video
DECC	Department of Energy and Climate Change
DESNZ	Department for Energy Security and Net Zero
DIN	Dissolved Inorganic Nitrogen
DIP	Dissolved Inorganic Phosphorous

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Term/Abbreviation	Definition
DO	Dissolved Oxygen
DSLP	Development Specification and Layout Plan
DTM	Digital Terrain Model
DWR	Deep Water Route
EC	European Commission
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMF	Electromagnetic Field
EMODnet	European Marine Observation and Data Network
EMP	Emergency Management Plan
EPS	European Protected Species
EQS	Environmental Quality Standards
ERCoP	Emergency Response Cooperation Plan
ES	Environmental Statement
ESA	European Space Agency
ESAS	European Seabirds at Sea
ESWEETS3	Enabling Sustainable Wind Energy Expansion in Seasonally Stratified Seas
EU	European Union
EUNIS	European Nature Information System
EURING	European Union for Bird Ringing
EUSeaMap	European Union SeaMap
FAME	Future of the Atlantic Marine Environment
FEPA	Food and Environment Protection Act
FIR	Fishing Industry Representative
FLOW	Floating Offshore Wind Farm
FMMCP	Fisheries Mitigation, Monitoring and Communication Plan
FSA	Formal Safety Assessment
G7	Group of Seven
GCB	Green Construction Board
GCR	Geological Conservation Review
GDL	Gardens and Designed Landscapes
GEBCO	General Bathymetric Chart of the Oceans
GEP	Good Ecological Potential

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Term/Abbreviation	Definition
GES	Good Ecological Status
GHG	Greenhouse Gas
GIS	Geographic Information System
GLVIA3	Guidelines for Landscape and Visual Impact Assessment Third Edition
GPS	Global Positioning System
GT	Gross Tonnage
GVA	Gross Value Added
GW	Gigawatts
HDD	Horizontal Directional Drilling
HES	Historic Environment Scotland
HMRI	Helicopter Main Route Indicator
HPAI	Highly Pathogenic Avian Influenza
HRA	Habitats Regulations Appraisal
Hs	Significant Wave Height
HSE	Health and Safety Executive
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
HWDT	Hebridean Whale and Dolphin Trust
IALA	International Association of Lighthouse Authorities
IAQM	Institute of Air Quality Management
IBTrACS	International Best Track Archive for Climate Stewardship
IBTSWG	International Bottom Trawl Survey Working Group
ICE	Inventory of Carbon and Energy
ICES	International Council for the Exploration of the Sea
ICOMOS	International Council on Monuments and Sites
IEMA	Institute of Environmental Management and Assessment
IFP	Instrument Flight Procedures
IHO	International Hydrographic Organisation
IMO	International Maritime Organization
INNS	Invasive Non-native Species
INTOG	Innovation and Targeted Oil and Gas
IPCC	Intergovernmental Panel on Climate Change
IPF	Initial Plan Framework
IROPI	Imperative Reasons of Overriding Public Interest
IUCN	International Union for Conservation of Nature

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Term/Abbreviation	Definition
JNCC	Joint Nature Conservation Committee
ka	Thousand Years
kBq	Kilobecquerel
KIS-ORCA	Kingfisher Information Service - Offshore Renewable Cable Awareness
km	Kilometres
kV	Kilovolts
LAT	Lowest Astronomical Tide
LCT	Landscape Character Type
LEDS	Liquid Effluent Discharge System
LiDAR	Light Detection and Ranging
LMP	Lighting and Marking Plan
LoD	Limit of Detection
LSR	Likely Significant Risk
m	Metres
mm	Millimetres
MAIB	Marine Accident and Investigation Branch
MarLIN	Marine Information Network
MARPOL	The International Convention for the Prevention of Pollution from Ships
MBES	Multibeam echosounder
MBT	Monobutyltin
MCA	Maritime and Coastguard Agency
MCAA	Marine and Coastal Access Act
MCZ	Marine Conservation Zone
MD	Marine Directorate
MD-LOT	Marine Directorate – Licensing and Operating Team
MD-SEDD	Marine Directorate – Science Evidence, Data and Digital
Met	Meteorological
mg/l	Milligrams per Litre
MGN	Marine Guidance Note
MHWS	Mean High Water Spring
MIACH	Marine and Intertidal Archaeology and Cultural Heritage
Mil AIP	Military Aeronautical Information Publication
MLWS	Mean Low Water Spring
MMMP	Marine Mammal Mitigation Plan/Protocol
MMO	Marine Management Organisation

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Term/Abbreviation	Definition
MNWFA	Mallaig and Northwest Fishermen’s Association
MoD	Ministry of Defence
MPA	Marine Protected Areas
MPCP	Marine Pollution Contingency Plan
MPS	Marine Policy Statement
MSL	Mean Sea Level
MU	Management Units
MW	Megawatts
N	Nitrogen
NAEI	National Atmospheric Emissions Inventory
NAO	North Atlantic Oscillation
NASA	National Aeronautics and Space Administration
NATS	National Air Traffic Services
NBN	National Biodiversity Network
NC	Nature Conservation
NCCT	National Coastal Character Types
NCMPA	Nature Conservation Marine Protected Areas
NDC	Nationally Determined Contributions
NGO	Non-Governmental Organisation
NLB	Northern Lighthouse Board
nm	Nautical Mile
NMP	National Marine Plan
NMPi	National Marine Plan interactive
NOTAM	Notice to Aviation
NOx	Nitrogen Dioxide
NPF	National Planning Framework
NPF4	National Planning Framework 4
NRA	Navigation Risk Assessment
NRHE	National Record of the Historic Environment
NRS	National Records of Scotland
NSA	National Scenic Area
NSTA	North Sea Transition Authority
NtF	Notice to Fishermen
NtM	Notice to Mariners
NTU	Nephelometric Turbidity Unit

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Term/Abbreviation	Definition
NVZ	Nitrate Vulnerable Zones
O&M	Operation and Maintenance
OAA	Option Agreement Area
OFLO	Offshore Fisheries Liaison Officer
ONS	Office for National Statistics
OREI	Offshore Renewable Energy Infrastructure
OS	Ordnance Survey
OSP	Offshore Substation Platform
OSPAR	Oslo-Paris Convention
OTNR	Offshore Transmission Network Review
OWF	Offshore Wind Farm
OWPS	Offshore Wind Policy Statement
P	Phosphorous
P2X	Power to X
PAC	Pre-Application Consultation
PAD	Protocol of Archaeological Discoveries
PAH	Polycyclic Aromatic Hydrocarbons
PAR	Photosynthetically Available Radiation
PCB	Polychlorinated Biphenyls
PDE	Project Design Envelope
PEMP	Project Environmental Management Plan
PEXA	Practice and Exercise Areas
PIANC	Permanent International Association of Navigation Congresses
PM	Particulate Matter
PMF	Priority Marine Feature
PO	Plan Options
PSA	Particle Size Analysis
PSR	Primary Surveillance Radar
PSU	Practical salinity units
PTS	Permanent Threshold Shift
PVA	Population Viability Analysis
RaDIN	Range Dependent Nature of Impulsive Noise
RBMP	River Basin Management Plan
RCS	Reactive Compensation Station
RIFG	Regional Inshore Fisheries Groups

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Term/Abbreviation	Definition
RIVM	Dutch National Institute for Public Health and the Environment (Rijksinstituut voor Volksgezondheid en Milieu)
RLOS	Radar line of sight
RMS	Root Mean Square
RNLI	Royal National Lifeboat Institution
ROVSVs	Remote Operated Vehicle Support Vessels
RRH	Remote Radar Head
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association
SAC	Special Areas of Conservation
SAR	Search and Rescue
SCANS	Small Cetaceans in European Atlantic waters and the North Sea
SCC	Scottish Coastal Current
SCOS	Special Committee on Seals
sCRM	Stochastic Collision Risk Model
SCUBA	Self Contained Underwater Breathing Apparatus
SD	Standard Deviation
SDG	Sustainable Development Goals
SEA	Strategic Environmental Assessment
SeabORD	Seabird Offshore Renewable Development
SELcum	Cumulative sound exposure
SEPA	Scottish Environmental Protection Agency
SFF	Scottish Fishermen's Federation
SFO	Scottish Fishermen's Organisation
SIMD	Scottish Index of Multiple Deprivation
SLA	Special Landscape Area
SLVIA	Seascape, Landscape and Visual Impact Assessment
SMP	Sectoral Marine Plan
SMU	Seal Management Unit
SNCB	Statutory Nature Conservation Bodies
SNH	Scottish Natural Heritage (now known as NatureScot)
SOLAS	International Convention for the Safety of Life at Sea
SOPEP	Shipboard Oil Pollution Emergency Plan
SOV	Service Operation Vessel
SOWEC	Scottish Offshore Wind Energy Council

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Term/Abbreviation	Definition
SOx	Sulphur Oxide
SPA	Special Protection Areas
SPFA	Scottish Pelagic Fishermen’s Association
SPM	Suspended Particulate Matter
spp	Species (plural)
SSA	Scottish Seafood Association
SSC	Suspended Sediment Concentration
SSP	Shared Socioeconomic Pathway
SSR	Secondary Surveillance Radar
SSS	Sea Surface Salinity
SSSI	Sites of Special Scientific Interest
SST	Sea Surface Temperature
STAR	Seabird Tracking and Research
STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
SWFPA	Scottish White Fish Producers Association
SWMP	Site Waste Management Plan
SWT	Scottish Wildlife Trust
TBC	To Be Confirmed
TBT	Tributyltin
TCFD	Task Force on Climate-Related Financial Disclosures
TEZ	Temporary Exclusion Zones
THC	Total Hydrocarbon
TJB	Transition Joint Bays
TOM	Total Organic Matter
TTS	Temporary Threshold Shift
UK	United Kingdom
UK IAIP	United Kingdom Integrated Aeronautical Information Package
UKCS	UK Continental Shelf
UKHO	United Kingdom Hydrographic Office
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNESCO	United Nations Educational, Scientific, and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UXO	Unexploded Ordnance

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Term/Abbreviation	Definition
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VMP	Vessel Management Plan
VMS	Vessel Monitoring System
VOC	Volatile Organic Compounds
WBCSD	World Business Council for Sustainable Development
WDC	Whale and Dolphin Conservation
WEWS	the Water Environment and Water Services (Scotland) Act 2003
WFD	Water Framework Directive
WLA	Wild Land Area
WoS	West of Scotland
WRI	World Resources Institute
WSI	Written Scheme of Investigation
WTG	wind turbine generator
ZTV	Zone of Theoretical Visibility

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APPENDIX 3 – BLADE TIP ZTV WITH KEY VISUAL RECEPTORS AND PROPOSED VIEWPOINTS

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